# FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

**First Aero Weekly in the World.**

**Founder and Editor: STANLEY SPOONER**

**A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport**

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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## Flight

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### CONTENTS


| Editorial Comment | PAGE |
|---|---|
| General Brancker on Air Transport | 635 |
| Success of Manchester Service | 636 |
| British "Airways" | 636 |
| A New Glider Prize | 636 |
| Curtiss Marine Flying Trophy Race | 637 |
| Royal Aeronautical Society Official Notices | 638 |
| R.A.F. Memorial Fund | 638 |
| Gliding, Soaring and Air-Sailing | 639 |
| The Handasyde Monoplane Glider | 640 |
| London Terminal Aerodrome | 643 |
| International Commission for Aerial Navigation | 644 |
| Correspondence | 646 |
| Personals | 647 |
| London–Continental Services | 647 |
| Airisms from the Four Winds | 648 |
| The Case for Metal Construction; By J. D. North | 649 |
| Royal Air Force | 651 |
| Institution of Aeronautical Engineers | 652 |
| Side-Winds | 652 |
| Imports and Exports | 652 |


### DIARY OF FORTHCOMING EVENTS

*Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:*

**1922.**

**Nov. 2** .... **Lecture, "A Review of Airscrew and Helicopter Theory," by Maj. A. R. Low, before R.Ae.S.**

**Nov. 30** .... **Closing date for FLIGHT Glider Designing Competition**

**Dec. 15–Jan. 2** **Paris Aero Exhibition**

**1923.**

**June** .... **International Air Congress, London**

**Dec. 1** .... **Entries close for French Aero Engine Competition**

**1924.**

**Mar. 1** .... **French Aero Engine Competition**

**Mar. 15** .... **Entries close for Dutch Height Indicator Competition**

## EDITORIAL COMMENT.



WHEN the announcement was first made that Gen. Sir Sefton Brancker had been appointed to the post of Director of Civil Aviation, we expressed satisfaction with the choice, knowing that in Gen. Brancker we should have a D.C.A. who was not afraid to express his views in forcible terms, who had kept in the very closest touch with commercial aviation, and who had eminently sound views on aviation matters—

**General Brancker on Air Transport**

neither suffering from an undue optimism nor, on the other hand, going so far as did the late Under-Secretary of State for Air as to believe, and frankly state in public, that he could see no future for aviation in Britain. During his few months' term of office Gen. Brancker has already shown himself—as we expected—ready to put into practice the suggestions which he has so long advocated for progress in the air. At every point concerning aviation he is on the alert, and no function of any importance takes place without the presence of the D.C.A. So much is this the case that no surprise is evinced if Gen. Brancker attends a meeting in London today, presides at an aviation function in Prague tomorrow, and suddenly bobs up in Paris within 48 hours. Certainly nobody could accuse him of taking things easily, and it is to be noted that he has now given in writing to the Press some very sound conclusions, whatever the Government views in the matter are. Perhaps without any Government actually in being, regulations also are in the air. At any rate, there can be no doubt that whatever may be the attitude of "those in high places," Gen. Brancker is doing good work. His article in the *Financial Times* of October 28 deals with Great Britain's need of air transport, and in it the D.C.A. puts the case for aviation very succinctly. The article does not, perhaps, contain anything very novel, nor anything very original, but it is calculated to explain to the man who has not made a special study of aviation the precise reasons why Britain must have air services, why these cannot pay at the moment, why there is reason to hope that they will pay within a very few years, and why, even if there were no hope of them ever paying their way, Imperial

needs would still necessitate our carrying on with them. As it is the man-in-the-street upon whom, ultimately, the fate of aviation must depend, such articles, from one in authority, cannot fail to do a great deal of good, and we therefore welcome them whether or not there is precedent for their publication.

**Success of Manchester Service**

Those who have expressed the view that internal air services in Great Britain could not be a success will be given food for thought by the report, under our London Terminal Aerodrome Notes this week, that up to the present the new service to Manchester has met with outstanding success, the bookings in several instances exceeding the available seats. Nor is there any reason to believe that, when the novelty wears off, the use of the air service will fall off. It is not as if the service ended at Croydon. If that were the case we quite agree that there might be scant prospects of lasting success for internal air services. But when it is remembered that at Croydon the internal service links up direct with a network whose branches run to many countries, and a network, moreover, which is bound to spread rapidly until it covers the entire globe, then services in Britain assume quite a different aspect.

**British "Airways"**

The announcement that the three companies now operating air services from Croydon intend to amalgamate to the extent of running their advertising and booking business in common will be received with satisfaction. As the three firms are no longer in competition with each other, there would appear to be no reason for a continued separate organisation, and very considerable reductions in certain expenditure should be possible with the new arrangement, thus bringing nearer the day when these air services can pay their way without other Government assistance than wireless and meteorological services. Certain overhead charges are very much the same whether one runs a service of one machine per day or ten machines per day, and anything which tends to reduce such charges should be welcomed. Some might object that the new arrangement is tending towards such undesirable words as "trust" and "monopoly," but while the Government virtually is conferring a monopoly on the firms selected to run these services and is paying them subsidies, this objection hardly holds good. Later on, when subsidies are a thing of the past, the position may need revising.

**A New Glider Prize**

Major Turner's mention in the *Daily Telegraph* of October 31 of a new prize of £1,000 for the greatest distance covered in a glider during next year, brings up the subject of new rules. When the rules for the *Daily Mail* competition were drafted there were many who firmly believed, and said so, that the minimum duration of 30 minutes would not be attained. Yet this minimum was actually exceeded on the very first day of the competition. It is obvious that little is to be gained by offering prizes for still longer durations. Theoretically, if a man can remain up for three hours there is no reason why he cannot remain up for 30 hours if the wind holds and he is physically capable of standing the strain.

The Royal Aero Club will, therefore, be faced with the problem of devising new rules for any new competitions which may take place in the future. In view of our present comparative ignorance of the subject, the task will by no means be an easy one, and the framing of rules may have the most far-reaching effects on the future development of the sport. It is, therefore, imperative that no hasty steps should be taken, and ample time should be devoted to the framing of new rules. The distance competition suggested, with a minimum of some 50 miles, may sound somewhat severe. So, for that matter, did the minimum of 30 minutes' duration, considering that not one of our pilots had had any experience before the opening of the competition. If it could be arranged to retain the rights to fly from and over the ridge from Itford Hill to Firle Beacon permanently, it seems probable that the best plan might be to delay the framing of any rules until pilots have had an opportunity of doing a certain amount of experimental work. If rules are drafted without the knowledge that would be thus accumulated, there appears to be a danger that such rules might, on the one hand, be so severe as to preclude success, or, on the other hand, be so easy of attainment that full benefit of the prizes—as regards real progress in the design, construction, and use of gliders—would not be attained, and the money thus largely wasted.

### Air Ministers of the New Government

JUST as we go to press the announcement is made that His Majesty the King has been pleased to approve the appointment of Sir Samuel Hoare, Bt., C.M.G., to the post of Secretary of State for Air, and of His Grace the Duke of Sutherland to the post of Under-Secretary of State for Air.

The appointment of Sir Samuel Hoare comes somewhat as a surprise, as nothing in his Parliamentary career has hitherto associated him with aviation. Sir Samuel as a banker and recognised authority on financial matters is paramount, but whether that is an advantage or the reverse in an Air Minister yet remains to be seen. Possibly it may be regarded as a good omen that the new Air Minister is the eldest son of the late Sir Samuel Hoare, Bt., who was M.P. for Norwich, the home of the famous Boulton and Paul all-metal aircraft.

The Duke of Sutherland has been associated with aviation for some years, being President of the Air League of the British Empire, and again quite recently he entered a machine in the race for the King's Cup. By tradition also His Grace is connected with flying, his father, the late Duke of Sutherland, being for a considerable period a member of the Council of the Royal Aero Club. Both men have the advantage of youth, Sir Samuel Hoare being 42 and the Duke of Sutherland only 35.

Although not directly connected with aviation under the new Government, Sir William Joynson-Hicks, as Parliamentary Secretary to the Overseas Trade Department, may be able to lend valuable assistance in matters relating to Imperial air communication, and thus his intimate knowledge of, and enthusiasm for, aviation matters may not be entirely wasted in his new post.

### Aerial Photography at the Royal Photographic Society

SQUADRON LEADER F. C. V. LAWS last week gave a lecture at the Royal Photographic Society on "Progress in Aerial Photography," during which lantern slides of great interest were shown. Major Laws stated that, whereas in 1914 it was difficult to locate dismounted troops on photographs taken from the air at any altitude above 3,000 ft., it was now possible to see even birds when photographed from a distance of a mile and a-half. This he illustrated by showing a picture of pigeons feeding on the steps of St. Paul's Cathedral taken from that height.

FLIGHT

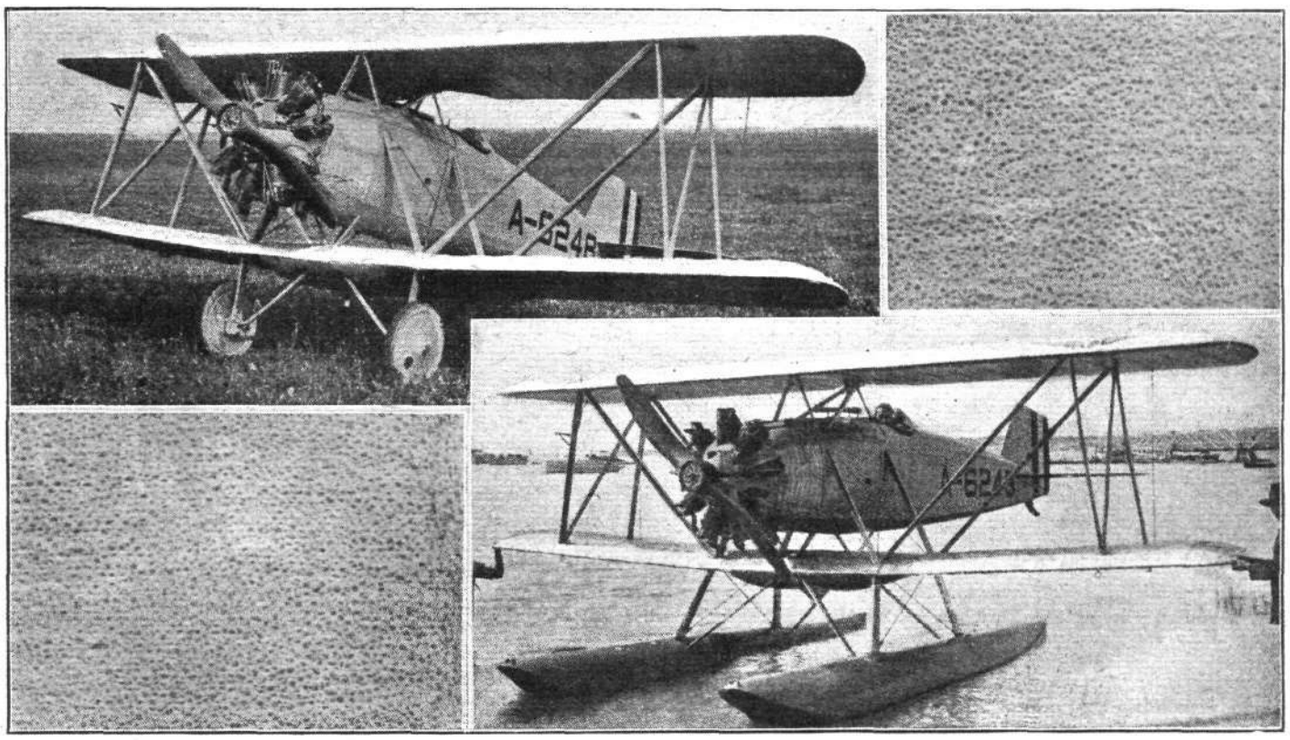
# THE CURTISS MARINE FLYING TROPHY RACE

THE Curtiss Marine Flying Trophy Race, which was held at Detroit on October 8 last, provided several exciting thrills. Postponed from the previous day on account of unfavourable weather, the conditions under which it was flown were by no means ideal, and out of the eight starters (ten entered) only two completed the course. The latter comprised a closed circuit of 20 miles, which had to be covered eight times, making a total of 160 miles. The start and finish were opposite Memorial Park, facing Belle Island in Detroit River, the course running along Belle Island and south of Peach Isle to a barge moored off the Canadian shore, thence across the mouth of the Detroit River and back along the northern bank.

The first four laps had to be covered entirely in flight, but at the end of the fifth, sixth, and seventh laps the competitors had to come down and taxi on the water for a distance of 400 yds. over a hairpin section marked out around the starting barge, then take off again and proceed on the next lap. This was quite an original and interesting feature for a seaplane race, and one that helped considerably to liven up the proceedings.

Excitement came with the fifth lap when the leading man, No. 15, came to taxi, which he did at rather high speed, in a cross wind, and narrowly missed the barge. No. 15 was more successful, going at less speed, but No. 4 more or less repeated No. 5's performance. The others came along in the same order as before. No. 3 experienced difficulties in taxi-ing and came to a stop between the two barges, and whilst motor boats were towing the machine out of the way No. 15, flying high, and No. 4 close behind, low down, came along for the taxi list. The former overshot the commencement of the taxi line, whilst the latter dived down close to the barge. Both managed to round the barge, but with great difficulty, and only fine piloting avoided a collision.

A surprise marked the end of the sixth lap, for No. 10, previously last, came in third, Nos. 5 and 12 having dropped out—the former crashing (fortunately without hurt to the pilot) near the Edison Station, and the latter through engine trouble. There were now only three left in the race, Nos. 4, 15, and 10. The last lap had to be completed in full flight, and No. 4 (Lieut. Sanderson) was almost on the point of



**THE CURTISS MODEL TS BIPLANE : This machine, which was built under special contract for the U.S. Navy, can be adapted for either land or sea work, the substitution of pontoons for land gear, as seen above, being easily accomplished. Note the petrol tank formed in lower centre section.**

The eight competitors were started off at intervals of one minute in the following order : (No. 5) Lieut. R. Irvine, Curtiss 18.T triplane, 375 h.p. Curtiss D.12 ; (No. 16) Lieut. D. Rittenhouse, Navy-Curtiss TR.3 biplane, 220 h.p. Wright E.3 ; (No. 12) Lieut. S. W. Calloway, Navy-Curtiss TS.1, 220 h.p. Lawrance J.1 ; (No. 15) Lieut. A. W. Gorton, Navy-Curtiss TR.1, 220 h.p. Lawrance J.1 ; (No. 3) Lieut. W. K. Patterson, Gallaudet D.4, 420 h.p. Liberty ; (No. 4) Lieut. L. H. Sanderson, Curtiss 18.T triplane 375 h.p. Curtiss D.12 ; (No. 10) Lieut. H. A. Elliott, Vought VE.7.H biplane, 220 h.p. Wright E.2 ; and (No. 11) Lieut. H. J. Brow, Navy-Curtiss, TS.2, 240 h.p. Aeromarine U.8.D.

Lieut Gorton (No. 15) won the Trophy at an average speed of 112·65 m.p.h., the only other to finish being Lieut. Elliott (No. 10), whose average was 109 m.p.h. We refer briefly to the machines later. At the end of the first lap No. 16 overtook No. 5, and the others remained as before. In the second lap Nos. 16 and 5 were first and second respectively, but No. 15 obtained third place from No. 12, and No. 4 changed position with No. 3. In the third lap the only change was that No. 4 got ahead of No. 12. In the next lap two machines, Nos. 15 and 11, dropped out of the race, the former's propeller having worked loose, and the latter losing all his cooling water through a leak.

victory when he ran out of petrol when half-way home, almost in sight of the finishing line. Thus, No. 15 (Lieut. Gorton) finished first, with No. 10 (Lieut. Elliott) not far behind.

The winning machine, the Curtiss TR.1, and the TR.3, TS.1 and TS.2 are all very much the same type of machine, differing only in the engines fitted and the wing sections employed. These machines were designed to give the smallest and most compact type giving the maximum facilities for erection and take-down on board ship. With this end in view all wires and turnbuckles in the wing bracing have been eliminated. The fuel tank is carried in the lower plane centre section, and is detachable so as to be dropped out of the machine at the will of the pilot. Another feature is the provision of interchangeable landing gear, enabling wheels to be fitted for land work or twin pontoons for water work as desired.

The TS models have the U.S.A.27 wing section, and the Lawrence J.1 220 h.p. 9 cyl. radial air-cooled engine is fitted to the TS.1, whilst the TS.2 has an Aeromarine U.8.D 240 h.p. 8 cyl. water-cooled V engine. The TR models have modified R.A.F.15 wing sections, and TR.1 is fitted with the Lawrance J.1, and TR.3 the Wright E.3 220 h.p. 8 cyl. water-cooled V engine.

We show in the accompanying illustration two views of the Curtiss type TS. The following characteristics apply to all four models, except where specified: Span, 25 ft.; chord, 4 ft. 9 ins.; gap, 5 ft. 6 ins.; length, 24 ft. 7 ins.; height, 9 ft. 6¾ ins.; incidence, 0°; dihedral (lower), 3°; wing area, 225 sq. ft.; gross weight, (TS.1) 2,025 lbs., (TS.2) 2,085 lbs. (TR.1) 1,790 lbs., (TR.3) 1,980 lbs.; maximum speed, (TS.1) 125 m.p.h., (TS.2) 130 m.p.h., (TR.1) 130 m.p.h.

We are indebted to our American contemporary *Aviation* for the foregoing particulars.

# ROYAL AERONAUTICAL SOCIETY NOTICES

*Lecture.*—The next fortnightly meeting takes place on November 16, at 5.30 p.m., when Mr. R. McKinnon Wood, Fellow, will read a paper on "The Co-relation of Model and Full-Scale Work," at the Royal Society of Arts, 18, John Street, Adelphi, W.C. 2.

*Students' Section.*—The Annual Meeting of the Students' Section was held in the Library, at 6.45 p.m., on October 12, when Mr. T. C. Sharwood was appointed Honorary Secretary in succesttion to Mr. S. H. Evans. It was decided that each college or group of students should nominate a student to represent it, and to further the interests of the Students' Section in the particular college or group concerned.

The annual meeting was followed at 7.30 p.m. by the inaugural address of the session from Dr. A. J. Sutton Pippard on "The Aeroplane considered as an Engineering Proposition," illustrated by lantern slides. The next Students' Meeting will take place in the Society's Library on November 9 at 7.30 p.m., when Mr. H. C. Brown will inaugurate the discussion with a paper on "Airships."

W. LOCKWOOD MARSH,
Secretary

# A PRIZE FOR PAPERS ON AIRSHIPS

THE Council of the Royal Aeronautical Society have decided to institute forthwith from the funds of the "R. 38" Memorial Research Fund, an annual prize for a technical paper on Airships. The regulations covering the award of this prize are given below, from which it will be seen that the date for the receipt of the names of intending competitors for the first award is December 31, 1922, while the papers themselves must reach the Secretary on or before March 31, 1923.

*"R. 38" Memorial Prize Regulations*

From the income of the above Fund, a sum of 25 guineas will be offered annually as a prize for the best paper received by the Royal Aeronautical Society on some subject of a technical nature in the science of Aeronautics. Other things being equal, preference will be given to papers which relate to Airships.

The prize is open to international competition. The Royal Aeronautical Society retain the right to withhold the prize in any year, if it is considered that no paper is of sufficient merit to justify an award.

Intending competitors should send their names to the Secretary of the Royal Aeronautical Society, 7, Albemarle Street, London, W. 1, on or before December 31 of each year, with such information in regard to the projected scope of their papers as will enable arrangements to be made for their examination. The closing date for the receipt of papers will be March 31 in each year.

Papers should in all cases by typed, and a copy should be retained by the author, as the Society can take no responsibility for the loss of copies submitted to it.

Successful papers will become the absolute property of the Society, and will in most instances be published in the Society's *Journal*. In regard to unsuccessful papers, the Society retains the right of publication in its *Journal*, but in each case will notify the author, shortly after the award, whether it intends to exercise this right. If not, the author will be free to publish elsewhere. A signed undertaking must accompany each paper to the effect that publication has not already taken place, and that the author will not communicate it elsewhere until the Society's award is published. Due acknowledgment must be made by the author of the source of any special information.

# R.A.F. MEMORIAL FUND

THE first meeting of the Executive Committee of the Fund, subsequent to the summer vacation, was held at No. 7, Iddesleigh House, Caxton Street, on October 18. There were present: Lord Hugh Cecil (Chairman), Lady Leighton, Dame Helen Gwynne Vaughan, Mrs. Barrington-Kennett, Mrs. L. M. K. Pratt-Barlow, Sir Charles McLeod, Air Vice-Marshal J. F. A. Higgins, Air Vice-Marshal A. V. Vyvyan, Group Capt. Ludlow-Hewitt, F. E. Rosher, W. S. Field.

The Hon. Treasurer, Sir Charles McLeod, submitted a financial statement to September 30 last, and reported that the "Struben Memorial Trust Deed" had been completed by the trustees of the Fund, constituting a capital sum of slightly over £1,000, the interest on which is to be used annually in the provision of assistance to the family of any officer of Maj. Struben's late son's unit, No. 25 Squadron, R.A.F., who meets with any casualty whilst actually flying on duty with No. 25 Squadron.

The Committee were unanimously of opinion that the time had arrived when the Sub-Committee dealing with grants for the assistance of ex-officers and men should be authorised to increase the amount of their grants, it being considered that the money would be better spent now than kept for subsequent years.

It was reported that the War Memorial on the Thames Embankment would be completed and ready for unveiling early in the new year, and it was decided to offer the wooden model of the War Memorial, which is now at the offices of the Fund, to the Air Officer Commanding, R.A.F. Cadet College, Cranwell, Sleaford, Lincs.

It was announced that the tablet in memory of the officers and men of the Flying Services, which is being put up in St. Mark's Church, South Farnborough, Hants, would be unveiled in the early spring of next year.

Mr. W. S. Field, Deputy Chairman of the Vanbrugh Castle School Sub-Committee (in the absence of the Chairman, Air Vice-Marshal Sir Geoffrey Salmond, K.C.B.), reported that 23 boys are now in residence at the school, and that two vacancies are shortly to be filled. He further reported that ten of the boys have qualified for entrance to the Roan Secondary School. The Committee approved of a suggestion made by Mr. Field, that the school accommodation be increased by the erection of an army hut in the grounds; this would admit of 25 more boys being taken. It being reported that the Sub-Committee found considerable difficulty in obtaining for admission the sons of airmen who had lost their lives in the Great War, who by age and otherwise were eligible for admission, the Committee sanctioned the admission to the school, in the near future, of the sons of serving airmen, always provided that no orphan boys were available when a vacancy arose.

## R.A.F. Club

DANCE NOTICE.—As the Victory Ball at the Albert Hall is to be held on November 8, 1922, the Committee have decided to alter the date of the next Club Dance to Friday, November 10.

## Airship Service Re-union

THE fourth annual re-union dinner of the R.N.A.S. and R.A.F. (Airships), Pulham, will be held at the Holborn Restaurant on November 11, at 6.45 p.m. The cost of tickets is fixed at 10s. (exclusive of wines). It is requested that those intending to be present would notify, on or before November 4, the number of tickets required to the secretaries, Mr. R. P. Pierce, the Great Hall, Tunbridge Wells, Kent, and Mr. F. W. H. Spratley, 8, Milner Road, Merton Park, S.W. 19. Arrangements are being made to join with other organisations in the Armistice Day services and placing of a wreath on the Cenotaph.

FLIGHT

# GLIDING, SOARING AND AIR-SAILING

*Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of* FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

M. MANEYROL, winner of the *Daily Mail* Gliding Competition, was the guest of honour at a reception given at the Sorbonne, on October 26, by the French Aerial Association. M. Laurent Eynac, Secretary of State for Air, presided at the reception. An assembly of nearly 2,000 applauded the speeches by M. Eynac, Col. Quinton, etc. Later it is announced that M. Laurent Eynac has recommended M. Maneyrol for the Cross of Chevalier of the Legion of Honour.

* * *

OUR unique photograph on this page shows the wings of the de Havilland glider breaking just after the starting ropes dropped off. The centre section remained intact, and may have contributed to a certain extent in breaking the fall of the machine. Capt. de Havilland points out that the wing structure of this glider had a factor of safety of 8 when rigidly braced for ailerons. There is little doubt that the wing structure was far too flexible for warp control, and the fact of fitting it could only be justified by the natural desire to obtain better lateral control in the very limited time available. The original ailerons were found to be rather ineffective, and this may also have been due to too great flexibility in the wing, which allowed the wing to twist under the load imposed by the aileron, thus destroying the effect by twisting the wing into a smaller angle, with a reduction in lift coefficient.

* * *

THE Sayers glider failed to come up to expectations at Itford, but when certain alterations have been made to the controls it is expected to be thoroughly tested out. From the way it floated off the ground there is little doubt that if the controllability can be improved the machine will glide well in fairly light airs.

* * *

MUCH the same applies to the Aircraft Disposal Co.'s monoplane, which appeared to float about like a parachute, and which evidently required very little wind to keep it up.

* * *

GORDON ENGLAND'S little monoplane must be of very sturdy construction, in spite of its light weight (100 lbs.). Although it struck nose first at a fairly high speed, the only damage actually caused by the crash was to the front portion of the *fuselage*. As far as could be ascertained the machine only required a new nose to be as good as new. The wings appeared to be as sound as ever after the crash.

* * *

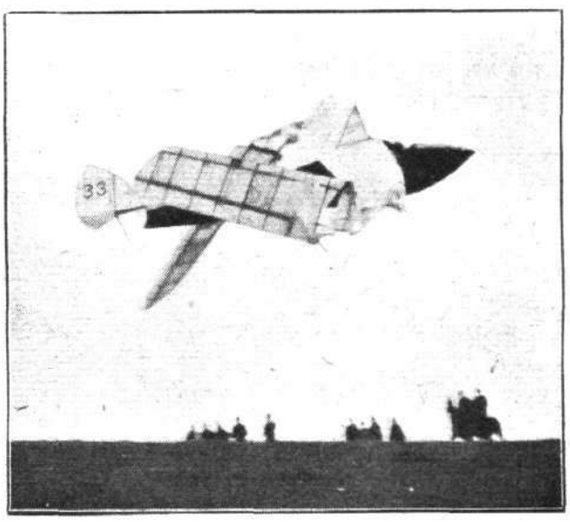
"THE lighter side of gliding" was not entirely neglected at the Itford competition. Officials and competitors were able to enjoy, while waiting for the weather to improve, team races between two of the Palmer wheel trucks used for hauling gliders up to the top of the hills. One race ended in a bad "landing," with several of the crew somewhat damaged but still cheerful. Our photographs show various incidents from these races.

* * *

ALTHOUGH visitors to Itford did not get an opportunity of seeing a great deal of the wing-flapping, pedal-driven, direct-lift machines, one or two provided a few moments' amusement. One was a little monoplane built on to an ordinary push bicycle. The designer tried once or twice near the foot of the hill, but being unable to get up sufficient speed, he had the machine taken some distance up the slope. Several R.A.F. airmen gave him a gentle push, and as the machine gathered speed it struck a rut, which sent it up in the air to a height of about 1 ft. and allowed it to make a "glide" of about 6 or 8 ft. In the landing a man was knocked over by a wing tip, but otherwise no untoward incident happened.

* * *

ANOTHER weird contraption became known as "the Bride," owing to its trailing tail, which had to be held up by "pages." So far as we could ascertain this machine was never tested,



**The D.H. glider "finishing."**

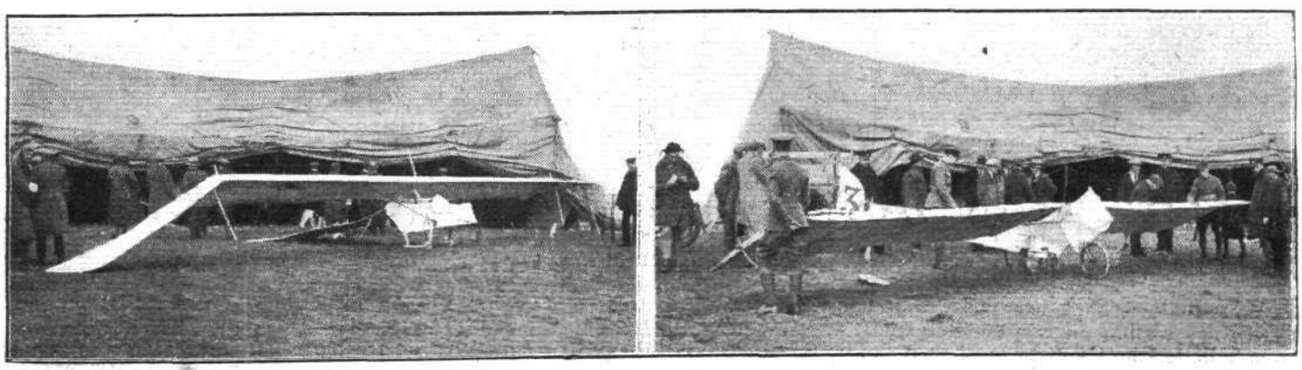
but its constructor probably had a good deal of fun in building it. That readers should not miss it, we publish a photograph in this issue.

* * *

FROM Germany it is reported that Herr Hentzen recently made an attempt to beat Maneyrol's duration record. He succeeded, however, only in remaining up for about 40 minutes, owing, it is stated, to unfavourable weather conditions.

* * *

WE learn that Mr. G. H. Handasyde and Mr. Sydney Camm are busily at work re-designing the Handasyde glider.



**A COUPLE OF NON-STARTERS AT THE GLIDING COMPETITION : On the left the "Bride," so-called from the large flexible trailing tail, which had to be carried by "pages." On the right, a bicycle fitted with wings. This machine made one "flight" of about 8 feet, at an altitude of 18 inches.**



**A TROLLEY-RACE BETWEEN TWO TEAMS : On the left, Raynham, Wallace Barr, and Flight Lieut. Longton are seen wheeling their machine to the top of the hill, while Commander Perrin is trying to light a cigar. On the right, Perrin, Longton, Raynham and Wallace Barr are getting away from the rival team, one of whom is Howard Wright, who was somewhat knocked about when his " Ship " struck a gate.**

Although the machine did exceptionally well in the competition, it is felt that certain improvements are required, and these will be incorporated in the next machine.

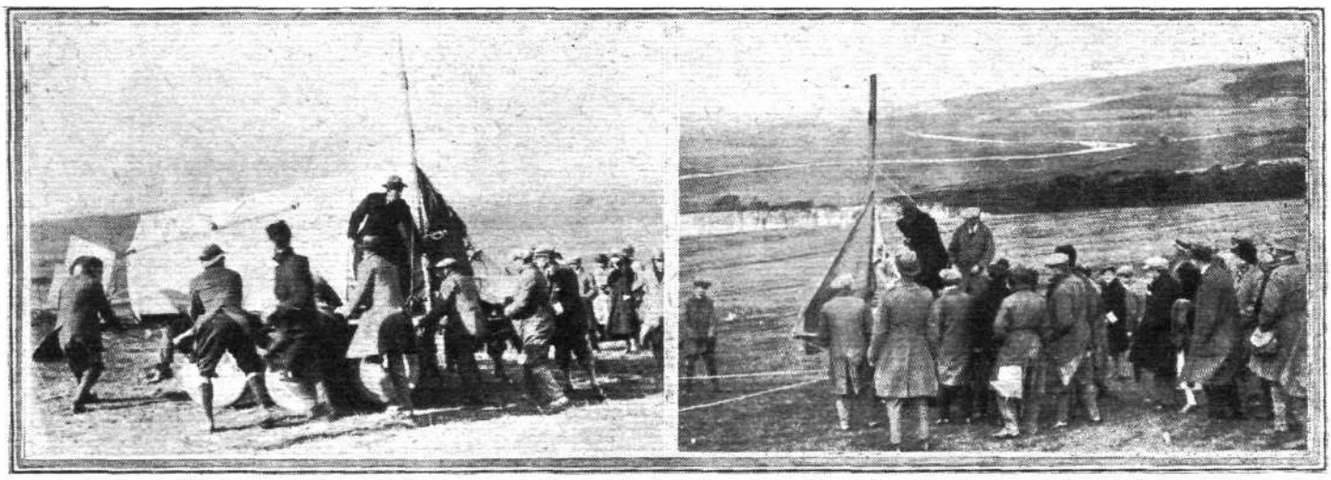
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A YOUNG German lady, Fräulein Hansen of Magdeburg, is reported to have made a flight of five minutes' duration in a glider designed and constructed by herself.

touch with others on Tyneside interested in gliding, in order to discuss the formation of a gliding club, with the object of designing, building and flying gliders.

* * *

MR. ALEX. PEACOCK, of 37, Oakland Road, W. Jesmond, Newcastle-on-Tyne, informs us that he is willing to join in the formation of a gliding club in his district. As he is he states, a partner in a woodworking and engineering firm



**FOR IDLE MOMENTS : Competitors and officials were never at a loss for amusements during unsuitable weather conditions. Our pictures show the " Sand Yacht " rigged up from a trolley, a glider wing, etc., making successful beats down the hill-side.**

A GLIDING club, to be known as *l'Icare*, is being formed in France. A technical committee of the club is being formed so as to deal with inventions and designs. The President of the Club is M. Lucien Martin, of 51, Rue de Belleville, Paris.

* * *

MR. J. W. HOLMES, of 18, Ocean View, Whitley Bay, Northumberland, writes us that he is desirous of getting in

his services and experience might be of considerable value to a club in the district.

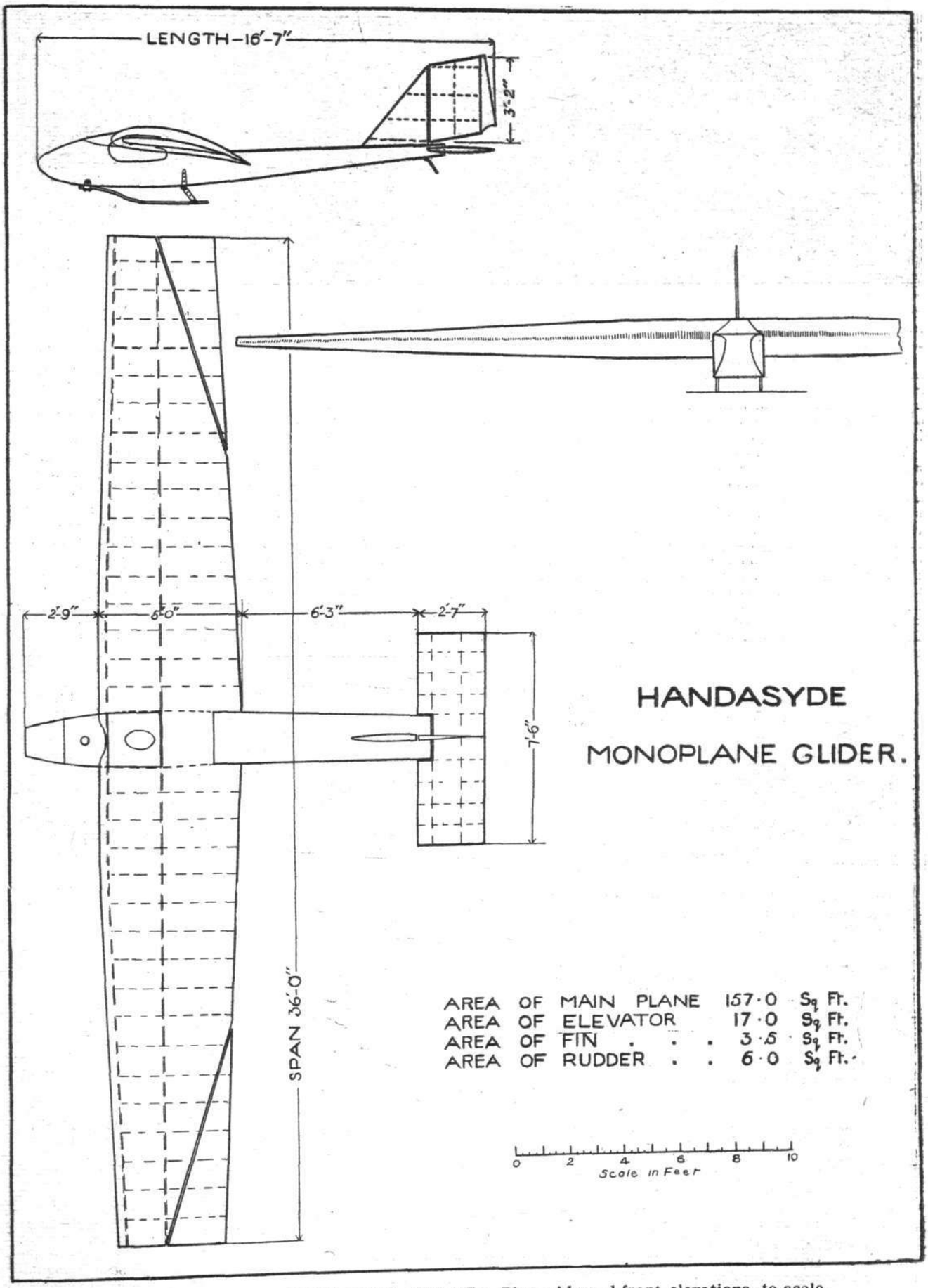
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MESSRS. BEARD AND FITCH, of 34, Aylesbury Street, London, E.C. 1, wish us to state that, although they are gear-cutting specialists and experimental engineers, they are quite prepared to undertake construction of gliders to clients' own designs, and to give advice on inventions in connection with gliders.

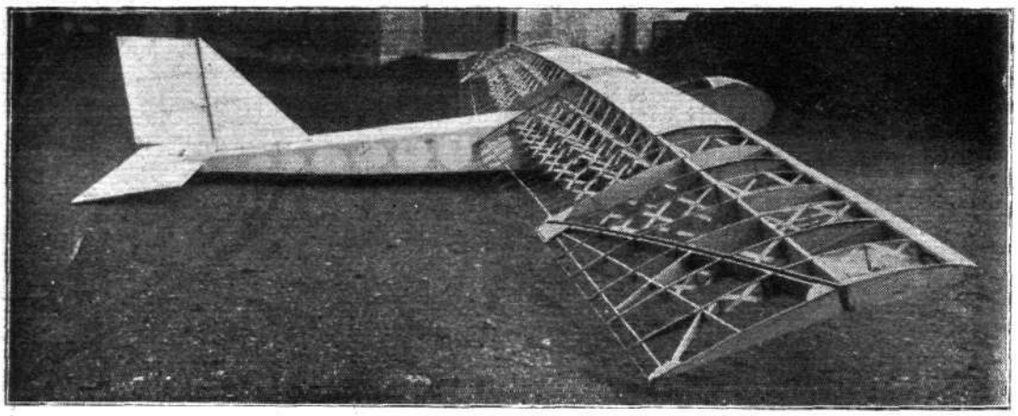
# THE HANDASYDE MONOPLANE GLIDER

## The Machine on which Raynham Remained Up for Nearly Two Hours

THE Handasyde Monoplane Glider was designed by Raynham and Sydney Camm in conjunction with Mr. Handasyde. It was built for the Handasyde Aircraft Co. by the Air Navigation Co. (Blériot's) at Addlestone. It is characterised by a large tapered cantilever wing, whose section at the root, and for a distance of 4 ft. out from the centre line, is that known as Göttingen No. 441. The *fuselage* is of very small cross-sectional area, and is constructed of a light framework of spruce, covered with three-ply. In order to lighten the *fuselage* the ply-wood covering has had circles cut out in each bay, but fabric covering is put on over the three-ply. It would appear that the particular method of cutting away is open to criticism, and it might have been better to leave diagonal strips in each bay, cutting away triangular pieces only, as in this manner each bay would have been triangulated, which can scarcely be the case with the whole centre cut away. However, in spite of this the *fuselage* appears to be very rigid, also against torsional stresses, and no difficulty whatever was experienced in this respect. At the stern the body terminates in a horizontal strip about 2 ins. deep, to




THE HANDASYDE MONOPLANE GLIDER : Plan, side and front elevations, to scale.



**The Handasyde Glider : View of the machine in skeleton, taken during construction at Addlestone.**

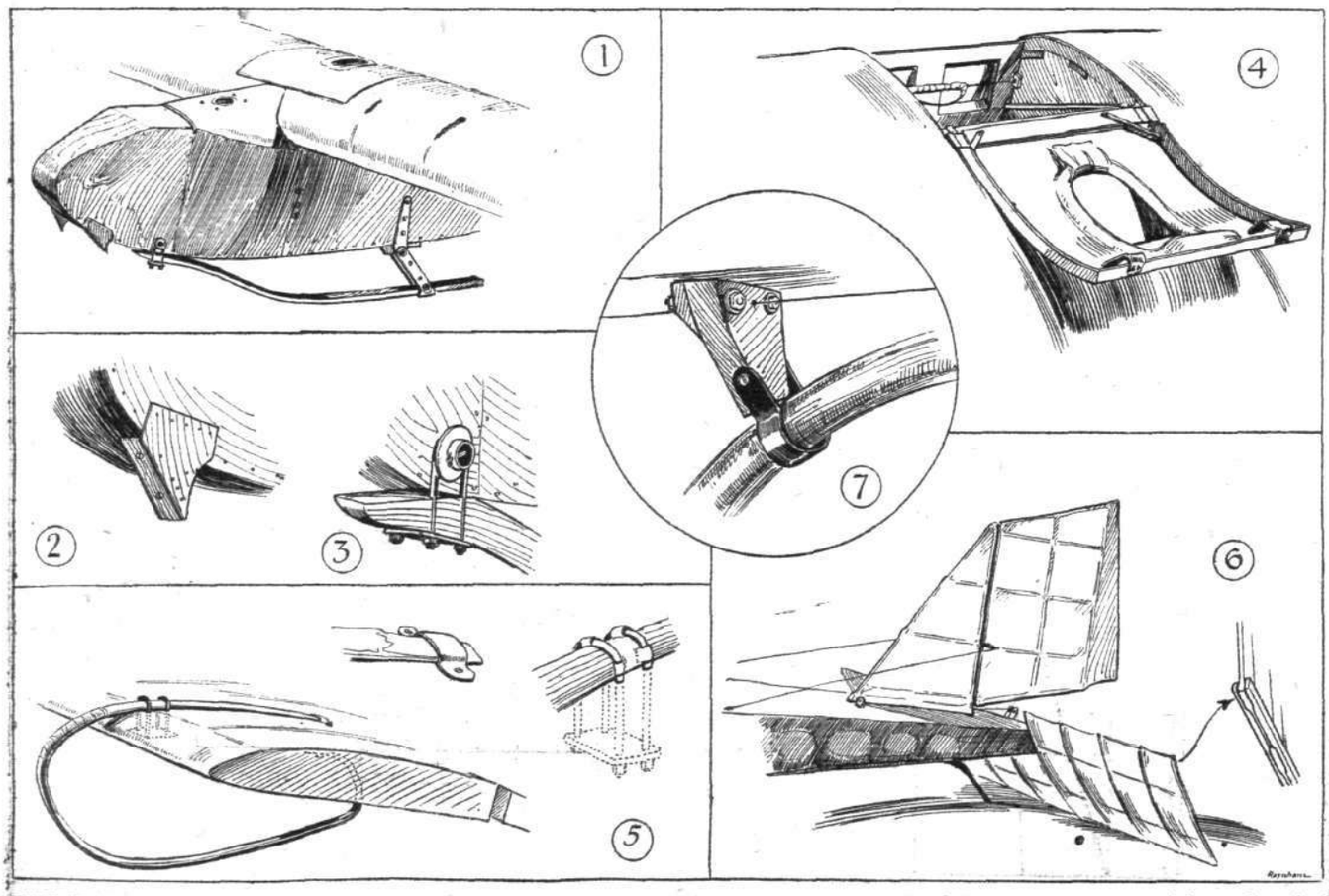
which the balanced elevator is hinged. A light tail skid keeps the elevator from touching the ground in getting off and landing.

In front the *fuselage* shows a rounded nose (as seen in plan), and the top *longerons* slope upwards slightly from the rear spar to the nose. The wing spars are secured to the *fuselage* by long " stirrups " of duralumin, and no external bracing of any sort is provided, the wing being so constructed as to be very rigid both in direct bending and in torsion.

The wing is built up on two spars, formed by top and bottom flanges of spruce, with a three-ply web on one side only, except at certain points where both sides of the spars are covered with three-ply. In order to strengthen the wing the covering over the inner portion is three-ply wood underneath the fabric. This ply-wood is used both on upper and lower surfaces, being in fact bent over the leading edge and extending back, top and bottom, to the rear spar, which is placed well forward in the section so as to give a flexible trailing edge. The latter is formed by a wire. The taper is fairly pronounced, both in plan and thickness, and the wing is given a " humped " appearance by the fact that the taper in the spars is greater on top than underneath. As a matter of fact, we believe that at the tip the lower surface of the main spar is only about 1½ ins. above the *longeron*, while the upper surface slopes down to it.

Triangular *ailerons* are fitted at the tips, being hinged to strips carried on the overhanging portion of the outer ribs. A light stringer runs through the whole wing a few inches forward of the wire trailing edge, and, although not taking any part in the direct loads, serves to stiffen the wing structure, notably the ribs, very considerably.

The controls are of somewhat unusual type. The " joy stick " is placed on the right, and is used for operating the balanced elevator only. The rudder is worked by two pedals, so that when the pilot's feet are off the pedals the rudder cables hang quite slack. This gave many the erroneous impression that the cables were broken. The *aileron* control is of the simplest possible type. In fact, there is none, in the ordinary sense of the term. The *ailerons* are operated by the pilot gripping the *aileron* cable with his left hand and pulling the cable to one side or other. As the cable passes along the front spar, in front of the pilot, it was decided that a lot of unnecessary complications, such as pulleys, crank-levers, etc., could be dispensed with by using




**THE HANDASYDE MONOPLANE GLIDER : Some constructional details. 1. The nose of the machine, showing landing skids. 2. One of the cleats which support the launching rope during the start. 3. Front attachment of landing skid. 4. Cover over cockpit thrown back. When the cover is pulled down the pilot's head projects through the small opening. Note the hand guard on the aileron cable. 5. Details of a wing tip skid. 6. The tail. 7. Detail of tail skid attachment.**

this form of control, and Raynham, once he had got used to the controls, found no difficulty in handling the machine. At first his fingers used to get cramped with gripping the bare cable, but later a guard was fitted, and tape wrapped around the cable, which improved matters considerably.

The vertical tail members consist of a triangular fin and a rudder of approximately parallelogram shape. The first rudder fitted was found to be too small, and a larger one was made, which gave some improvement. An addition to this was, however, found advisable, and this is shown in the side elevation of the general arrangement drawings. As a matter of fact we rather think that the rudder was large enough, and that what was really the trouble was that there was not sufficient fin area forward (the *fuselage* being of small depth) to afford a pivot for the machine to turn upon. In other words, the machine would probably fly somewhat like the old box kites, which had no fin surface forward, and which had to be assisted in a turn by the *ailerons*.

The pilot's cockpit is a very small one, and we believe that actually Raynham was measured for it. He certainly seemed to fit it with but little room to spare. The cockpit is placed between the main wing spars, and is covered with a three-ply panel in which is cut a hole for the pilot's head. We believe that when flying Raynham found this position quite comfortable, as there was very little draught, the air probably shooting up above the pilot's head. Let into the coaming over the cockpit is one of the new Smith and Sons' air speed indicators.

The undercarriage consists of two ash skids, anchored at their front ends to the lower *longerons*, and supported at the rear by short struts which are so pivoted that they are free to swing back as the load comes on the skids. The machine pulls up almost instantly on touching, and as the wings are very close to the ground, and the tips protected by cane loops, the machine never showed any tendency to turn over. Furthermore, the low wing position appears to give a certain amount of "cushioning" effect in landing, while assisting the machine to get off at a very low speed.

When the sluggishness of the directional control has been remedied the Handasyde monoplane should be a very excellent machine, as it certainly rises in quite low winds and appears very steady laterally. That Raynham should have been able, on his fifth flight, to remain up for nearly two hours is a remarkable testimony not only to his skill but also to the general design of the machine. We hope to hear of further flights being made on it as soon as it has finished its "show" at Selfridge's, and the few ribs damaged in transport have been repaired.

# LONDON TERMINAL AERODROME

Monday evening, October 30.

DESPITE bad weather, the air services have been maintained with commendable regularity, the Manchester service being run every day in spite of the fact that it was thought, in many quarters, that the inland mist—combined with the smoke in the industrial centres—would prove a great obstacle to the regular operation of this service. On Thursday and Friday in the early morning there was a thick fog over the aerodrome, and, to some extent, this dislocated the air traffic. The Daimler machine from Manchester started as usual, but, on arriving over Crewe, discovered a thick fog there, and, having received a report by wireless that Croydon was also fog-bound, the pilot decided to return to Manchester. The weather cleared rapidly, however, and he was soon away again, and managed to get right through to Rotterdam before darkness came on.

Friday's fog, though of a more lasting character, was more or less local. Machines started at the ordinary time from Cologne, Amsterdam, and Manchester. The Cologne machine waited at Brussels for the weather to clear, and the machine from Amsterdam got as far as Lympne, and there alighted for weather reports. The machine from Manchester landed at Stag Lane, and the passengers for London were sent into town by car from that aerodrome, arriving in London to schedule. This is the great advantage of the Manchester service, because when weather conditions are bad at Croydon, it is often possible to land passengers at one of the numerous aerodromes round London; and, as there are of course no Customs formalities, passengers can reach their destinations quite to schedule.

### "Express" from Paris Arrives by Night

ON Saturday a Handley Page, W.8, piloted by Mr. MacIntosh, completed its journey from the coast to Croydon after dark. All the usual lights at Croydon were in operation, and shells and rockets were fired at regular intervals. The machine suddenly appeared out of the darkness to the south-west, and made a perfect landing.

The three British firms have agreed to pool their resources in regard to certain mutual operations and expenses. It is understood that advertising will be on a combined basis in future, and that the advertisements will be in the nature of an appeal to the public to travel by British "airways," and will further state to what places British airways run. In addition, certain ground operations at Croydon, which can be combined to mutual advantage, will be made common to all three companies, thus eliminating much of the overlapping which now exists.

### Gratifying Figure as to Passengers

THE passenger traffic continues to keep up in a surprising manner, considering the period of the year. Handley Page Transport rarely send a machine without an absolutely full load, and the passengers on both the Cologne and Amsterdam routes are, if anything, increasing. Between London and Manchester 40 passengers were carried in the six days last week. On Saturday there was not enough accommodation in the machine for all who wished to travel from Manchester to London. I am informed that at Manchester the business men arrive at the aerodrome carrying bags a few minutes before the machine is due to start, and book their tickets just as they would on the railway. This is, of course, encouraging, but at the same time, with limited accommodation available, it has already led to disappointments on occasion.

Incidentally, it may be mentioned that a machine from London to Manchester made the flight in 1 hr. 39 mins. one day during the week, the actual flying time from Amsterdan to London being, on that occasion, only 4 hrs.

A Napier "Lion" engine, which has just completed 200 hours in the air in one of the Daimler D.H.34's, has now been taken down for overhaul, and it has been discovered that, despite this arduous period of service, the motor shows practically no signs of wear-and-tear, and is, to all intents and purposes, in the same condition today as it was on the day when it first began running.

Today (Monday), despite extremely bad flying weather, the London-Manchester services were completed to schedule in both directions. The London-Amsterdam machines also maintained their services. Between London and Paris very adverse conditions led to services being cancelled.

I hear, as an eleventh-hour piece of news, that most of the seats on the Daimler "air expresses" from Manchester to London are already booked up for days ahead. Manchester business men are, indeed, living up to their reputation of being "live wires," and are quick to see the advantage of a flying "express" which, leaving at a convenient hour in the morning, will rush them up to town in such record time.

### Lord Beatty on Armaments

AT Leeds on October 18, Lord Beatty, when the freedom of that City and the Hon. Degree of D.L. of Leeds University were conferred upon him, said that one of the lessons of history was that security at sea was vital to our Empire. It was said that the development of aerial warfare would rob, or had robbed, us of some of the advantages of our insular position, and that it would lessen the need for naval defences, but a study of all the problems involved would indicate how utterly fallacious such a doctrine was. The British Empire consisted of something more than the British Isles. The strength of this wide-spread Empire lay in its physical as well as its moral unity, and its physical unity was, and must always be, maintained by sea.

It was recognised that the acceptance by the British Government of the standard laid down at the Washington Conference was unimpeachable evidence of the desire of the British Empire for peace.

The standards of strength adopted by the Great Powers were those which seemed to them, after most patient consideration, to give the best possible prospects of peace. It was an unfortunate fact, however, that in the present state of civilisation the casting aside of proper means of defence did not make for peace, and therefore we could not afford to relax altogether the precautions necessary to maintain our national and imperial interests. We could not rely on the forbearance of friends for our continued existence as a great world Power.

# INTERNATIONAL COMMISSION FOR AERIAL NAVIGATION

THE first public session of the Commission was held on October 27 at 5, Old Palace Yard, Westminster, Maj.-Gen. Sir W. Sefton Brancker presiding, countries which have ratified the 1919 International Air Convention, which governs civil aviation, being represented, including, Belgium, Bolivia, the British Empire, France, Greece, Japan, Persia, Portugal, the Kingdom of the Serbs, Croats and Slovenes and Siam. A representative of the General Secretariat of the League of Nations was also present, having been appointed to attend in order to convey information to the League. The proceedings were conducted mainly in French.

*Age Limits for Pilots.*—A report from the Medical Sub-Committee on the fixing of rules, mentioned in Annexe E of the Convention for the medical examination of pilots, recommended that no pilot should be engaged before attaining the age of 19 or after attaining the age of 45, and that medical re-examination should take place after six months or after a pilot had flown 250 hours, whichever occurred first.

The recommendation was adopted.

*The Use of Wireless.*—The Commission next considered the report of a Sub-Committee on the use of wireless apparatus on aircraft, and agreed, as a general principle, that all aircraft engaged in public transport must carry wireless apparatus. At present this provision is applied only to aircraft able to carry ten or more persons. Aircraft carrying fewer than ten persons, and flying more than 100 miles over land without landing, or more than 15 miles over sea, must carry wireless apparatus within two years.

*Votes of the Contracting States.*—With regard to Article 34, which relates to the distribution of votes in the International Commission for Air Navigation, a proposal was made by the Belgian delegate to the effect that each contracting State should have one vote only, that any amendment of the annexes to the Convention must be carried by a three-fourths majority, and that no amendment of the annexes should be passed without the consent of at least three of the following States—United States of America, Great Britain, France, Italy and Japan.

In accordance with a suggestion made by the Chairman, this matter was referred for the consideration of each individual Government prior to the holding of the next assembly.

*Nationality Letters.*—The French Delegation submitted a note in which they emphasised the desirability of the nationality letter being the same for aircraft registration as for wireless calls, and suggested that those countries to which no aircraft registration letter had been allotted under the Air Convention should be requested to adopt now the same letters for aircraft registration as for international wireless calls.

To give effect to this, Lieut.-Col. Blandy, Controller of Communications in the Air Ministry, was appointed Reporter to prepare a list of suggested letters for those countries to which a letter has not already been allotted under the Air Convention. It was also decided to request the League of Nations to help to induce other nations which are members of the League, but not yet parties to the Air Convention, to adopt the letters which would be proposed.

*Flights over Foreign Territory.*—The Commission decided to amend Article 5 of the Convention so that it would read as follows: "No contracting State shall, except by a special and temporary authorisation, permit the flight above its territory of an aircraft which does not possess the nationality of a contracting State, unless it has concluded a special convention with the State in which the aircraft is registered. The stipulations of such special convention must not infringe the rights of the contracting parties to the present Convention, and must conform to the rules laid down by the said Convention and its annexes. Such special convention shall be communicated to the International Commission for Air Navigation, which will bring it to the knowledge of the other contracting States."

The Chairman remarked that the article in its new form would make it easier for other nations to enter the Convention. It had been proposed that the Article should be signed by some of the States that day. He understood, however, that none of the delegates had yet received the authority of his Government to sign, although it was certain that everyone would sign it. The British Government must consult India and the self-governing Dominions. It was therefore suggested that he, as chairman, and Mr. Roper, as Secretary-General, should sign it as indicating the approval of the Commission to the draft, and that it would then be signed by the representatives of the contracting States as they received authority from their Governments.

This course was adopted.

On the invitation of Col. Van Crombrugge, on behalf of the Belgian Government, it was decided to hold the next session of the Commission at Brussels about February 20.

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On October 24 an official dinner by the Government was given to the members of the Commission at Lancaster House (London Museum), when amongst those present were The Duke of Sutherland, His Excellency M. le Comte de Saint-Aulaire, M. P. E. Flandin, Maj.-Gen. the Right Hon. J. E. B. Seely, Baron Gonsuke Hayashi, Maj.-Gen. Sir W. Sefton Brancker, Sir Walter F. Nicholson, Sir Wm. Joynson-Hicks, Bart, M.P., M. Michel Gavrilovic, Sir Edgar Walton, M. Laurent Eynac, Viscount Max Vilain XIV, Sir James Stevenson, Sir H. White-Smith, Lieut.-Col. Mervyn O'Gorman, Maj.-Gen. Sir Frederick H. Sykes, Brig.-Gen. Shizuma, Mr. A. H. Ashbolt, Capitaine de Corvette Sablé, Lieut.-Aviateur Chevalier Willy Coppens, Col. Van Crombrugge, Maj. J. P. C. Sewell, M. A. de Dordolot, Col. E. Gold, Col. J. Saconney, Col. Casse, Col. L. F. Blandy, Col. Prince Pridi, Comdr. F. A. Branco, M. Okuyama, M. George Mélas, F. H. Co'ler, E. E. Beare, M. Jean Youpis, F. G. L. Bertram, M. Albert Roper, M. A. B. Duval, Capt. Ogura, Maj. Peverel, Capt. Kuwahara, Dr. Garsaux, Col. C. B. Heald, M. Pepin, R. L. Megarry, Capt. Ragoul Vargas, Chief Eng. Sabatier, Capt. R. J. Goodman-Crouch, Lieut. Convents, F. Handley Page, Maj. C. C. Turner, G. Holt Thomas, Maj. T. E. Gullick, F. W. Emmett, C. P. Robertson, etc. etc.

Capt. F. E. Guest, M.P., Secretary of State for Air in the late Government, should have presided, but was prevented by other political duties, and his place was taken by Mr. Cecil Harmsworth, M.P., who was Under-Secretary of State for Foreign Affairs.

The Chairman, in proposing the toast of "Our Guests," explained that Capt. Guest had been carried away by the political gale, and, having a large share of the management of the party to which they both belonged, he had been compelled to go to the country, and greatly regretted that he was unable to be with them. Capt. Guest had written him a letter in which he said he hoped the work of the Commission, whose province was the world and the whole heavens falling within their jurisdiction, would be carried on with the same mutual goodwill which had existed up to the present, and would complete the tasks it had before it with every success. Proceeding, Mr. Harmsworth said that in the very early days of aviation, with his friend, Gen. Seely, he was a member of a House of Commons Committee established for the express purpose of keeping its eye on the Government and keeping it up to the scratch in the matter of the provision of aircraft. That was the second session of that most important Convention. The first was inaugurated in Paris by M. Poincaré under the most brilliant auspices, and he trusted that their second session would not be less successful. He personally attached great value to international conferences, although he was well aware that they were not now so popular as they used to be. But such conferences brought together in intimate relationship representatives of different countries, and assisted in removing predilections and prejudices. He was also glad that they were working under the ægis of the League of Nations, for he had unbounded confidence in the future of that body. Their task of laying down rules to govern aviation was no easy one, but it had great possibilities. Anyone contemplating the possibilities of warfare must conclude that unless some means of restraining international passions could be found there was no security for mankind. Aviation, the newest and most progressive of the arts, was capable of being of the greatest benefit to mankind in the way of establishing communications between the nations, assisting trade and commerce and improving the relations between the different peoples.

Responses were made in French by M. P. E. Flandin, chief French delegate, and M. Laurent Eynac, Under-Secretary for Air in France.

**Annual Dinner of No. 6 Wing, R.N.A.S.**

THE Annual Dinner of No. 6 Wing, R.N.A.S., Otranto, Italy, will be held at 7 p.m. on Saturday, December 9, at the Connaught Rooms, Kingsway. Officers who have not received invitations should apply to the Secretary, Mr. A. Lloyd-Taylor, "Compton," Highfield Road, Purley.

FLIGHT

# ROYAL AERO CLUB CELEBRATION DINNER

AT the Savoy Hotel on October 26, the dinner given by the Royal Aero Club to celebrate the British victory of the Supermarine-Napier flying boat in the Jacques Schneider Seaplane Race and the holding of the Circuit of Britain Air Race for the King's Cup was well supported in spite of General Election activities. Lieut.-Col. J. T. C. Moore-Brabazon, Chairman of the Club, presided, the company including

Princess Ludwig Lowenstein-Wertheim, Lady Llangattock, Mrs. Moore-Brabazon, M. P. E. Flandin, Maj.-Gen. Sir W. S. Brancker, K.C.B., Lieut.-Col. W. A. Bristow, Capt. S. Cockerell, A.F.C., Flight-Lieut. L. H. Cockey, Lieut.-Col. M. O. Darby and Mrs. Darby, Sir Walter De Frece, M.P., Lieut.-Col. Spenser D. A. Grey, D.S.O., Brigstocke Hitchings (Chairman, Bristol Liberal Club), Capt. H. B. Hooper (Vice-Chairman, General Steam Navigation Co.), Sir Samuel Instone, Sir Henry White-Smith, K.B.E., Lieut.-Col. F. K. McClean, A.F.C. (Vice-Chairman, Royal Aero Club) and Mrs. F. K. McClean, Douglas Vickers, M.P., J.P., F. Handley Page, Thomas Paxton (Lord Provost, Glasgow), H. Scott-Paine, Commander James Bird, W. N. Tribe (President, Bristol Stock Exchange), H. T. Vane, Capt. F. L. Barnard, Capt. H. C. Biard, A. J. A. Wallace Barr, R. Blackburn, Lieut.-Col. L. F. Blandy, D.S.O., Comm. F. A. Branco, Capt. J. C. Brooke, Lieut.-Col. Casse, A. J. Cobham, Capt. R. J. Goodman Crouch, Lieut.-Col. I. B. Davson, F. G. T. Dawson, Mrs. Dawson, Maj. Gilbert Dennison, A. R. Dresser, A. Duval, Maj. C. Graziani, C. G. Grey and Mrs. Grey, Flying Officer Leslie Hamilton, D.F.C., R.A.F., Comm. G. Hara, I.J.N., B. Hinkler, F. H. Jones, W. Kayley, R. W. Kenworthy, H. O. Lewis, Flight-Lieut. W. H. Longton, D.F.C., A.F.C., and Mrs. Longton, J. Lord, Flight-Lieut. F. L. Luxmoore, R.A.F., D. C. MacLachlan, W. O. Manning, Lieut.-Col. W. Lockwood Marsh, Lieut.-Col. V. Nicholl, D.S.O., M. Okuyama, Squadron-Leader H. J. Payn, R.A.F., H. E. Perrin and Mrs. Perrin, H. H. Perry, M. W. Piercey, H. J. Preston, Col. Prince Pridi, F. P. Raynham, G. T. Richards, C. P. Robertson, Flight-Lieut. V. A. H. Robeson, M.C., A. V. Roe, M. Sabatier, Comm. Sablé, Lieut.-Col. J. G. L. Searight, T. P. Searight, Squadron-Leader J. P. C. Sewell, R.A.F., Maj.-Gen. Shizuma, J. D. Siddeley, S. Sparkes, Mr. and Mrs. Spooner, B. Stevenson, Lieut.-Col. J. E. Tennant, D.S.O., M.C., G. Holt Thomas, Maj. C. C. Turner, Col. A. E. H. Van Crombrugge, Viscount Max. Vilain XIV, Featherstone Witty, J.P., etc.

The Chairman proposed the toast of "The King's Cup Air Race," and expressed his regret that the Duke of Atholl was unable to fill the chair owing to his absence in Scotland. He extended a welcome to the members of the International Commission on Aerial Navigation now present in London. He wished to draw attention to the fact that the Royal Aero Club, which had been in existence for over 21 years, started with lighter-than-air projects, and had become concerned with heavier-than-air projects, but it was not a necessary corollary of that policy that their speeches should become heavier also. The Chairman referred to the gliding contests that have taken place, and paid a warm tribute to the energy of their secretary, Mr. Perrin, who, he thought, was a real dynamic force, and who within two months found a site, got an organisation going, secured a representative entry, and through the Aero Club the gliding record was beaten. The presentation of the King's Cup immediately called to mind the name of Maj.-Gen. Brancker, who led a double life, for he was not only Director of Civil Aviation, but also chairman of the racing committee. The Chairman expressed his thanks to many others who had been responsible for the success of the race, and said that the handicapping was one of the most extraordinary features of the event, as was seen by the arrival of the machines. He paid a tribute to the gentlemen who entered the race as private individuals, mentioning especially Mr. F. P. Raynham, to whom he wished success next time.

The Chairman then presented the King's Cup to Sir Samuel Instone and a cup to Capt. F. L. Barnard, the pilot, who also received a number of prizes offered by newspaper owners and corporations for the pilot who made the best performance to their particular towns. Prizes were also handed to the pilots who finished the course.

Sir Samuel Instone expressed his thanks to His Majesty for presenting the Cup, to Gen. Brancker for originating the race and to the Aero Club for the excellent arrangements. He was certain that the race had given a new lease of life to aviation. It had inspired the country with confidence, and it was impressed with the fact that no special freak machines had been built for this race. The machines had been used in some cases for years without a single accident. The public confidence was shown by the fact that in civil aviation now there was scarcely a vacant seat in the machines, and that the passengers travelling were not people who were touring, but business men and women. A business community had realised that travelling by air was safe, and he thought they might claim that the race had done much to establish this confidence in the public mind.

Capt. F. L. Barnard, the pilot of the De Havilland machine, in also responding, expressed himself whole-heartedly in regard to the valuable aid and work put in by all who were associated with the active part of the race. Without them he considered he would have stood but a poor chance.

Mr. F. P. Raynham, the runner-up, who was greeted vociferously and who was awarded a silver cup, also briefly replied.

Maj.-Gen. Sir W. S. Brancker then proposed the toast of the winner of the Jacques Schneider International Seaplane Race. "We are a nation of sailors," said the General, "and we hope to be a nation of airmen; and our achievements within the last few years in flying justify the hope that we are going to be a nation of airmen. We should therefore be pre-eminent in the operations of aircraft, the principal aim of which is to fly across the sea." It was consequently satisfactory to know, continued the General, that the International Cup had been won this year by a British Supermarine flying boat, piloted by Capt. H. C. Biard. Our mastery of the air was due not only to the great qualities of our race, but to our remarkable geographical position and our vast overseas trade. Our position seemed to him to be both bad and good: bad, as it must be many years before the air traffic of the world crosses Great Britain; and good, because our Dominions must inevitably demand navigation of the air by British aircraft from every quarter of the globe. In the future flying boats must play a great part. In the few efforts that had been made they had not had a chance; but as the overseas demand increased, the flying boat must come into its own, and he hoped to see Supermarine boats of many horse-power flying all over the world.

Capt. H. C. Biard, who flew the Supermarine flying boat to victory, was then presented with a piece of plate.

Mr. Scott-Paine, managing director of the Supermarine Aviation Co., in responding, mentioned some of the difficulties and problems which they had to face before it was possible for them to get to Naples, including the transport question, which was so generously solved by the General Steam Navigation Co., who not only sailed out of their course to pick up the seaplane, but were content to receive payment in the glory of assisting a British machine to bring back the Trophy to these shores.

Mr. H. T. Vane, managing director of Messrs. D. Napier and Son, who also helpfully supplied one of their splendid engines, in also acknowledging the toast, strongly urged that a little solid encouragement should be accorded by the Government to the makers of engines and machines in contests of this character, to enter and build craft which would help to secure British supremacy in the air. This was done by other nations, notably France, by not only subsidy, but by the purchase of the successful machines and the placing of orders for replicas—a practical method of ensuring progress with every chance of obtaining the best that brains could devise.

The toast of "The Guests" was humorously put by Lieut.-Col. Frank McClean, M. P. E. Flandin responding in French. A vote of thanks to the Chairman concluded a very pleasant evening.

### The Americ an Duration World's Record

IT appears that the splendid performance put up by Lieut. J. A. MacReady and Oakley Kelly on October 5-6 last, when they remained "upstairs" for 35 hrs. 18 mins. 30 secs., was accomplished on a Fokker F.4 commercial monoplane (400 h.p. Liberty). This machine is officially known as the Army Transport T.2, and in order to equip it for long-distance flights, the following modifications were made: A tank holding 750 gals. or 4,500 lbs. of fuel was installed in the cabin, leaving sufficient room for the "spare" pilot. A door was cut in the forward wall of the cabin to enable the pilots to change places, and an extra control was installed in the cabin, from which the machine was controlled while the pilot left his cockpit.

# CORRESPONDENCE

*The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.*

## SCRAP THE LOT

[2062] I read with interest Prof. Bairstow's lecture on Prof. Langley's work, and am glad to see he has brought forward the case against the British administrative system of scientific control. I trust the matter will be pressed home until research workers get justice and fair play. When one has had experience of the system operating, it is easily understood why Britain lags behind in advanced design. Why should men who have specialised on a particular branch of research work be left to the tender mercies of some officials whose knowledge in many cases is only superficial, and limited to a subject which is common property. At the present stage of agitation for reform, and as far as some twenty years' experience with official experts is concerned, I think the following may be interesting to some FLIGHT readers.

In 1902 I patented the first heavier-than-air machine fitted with slotted planes, the angle of incidence of which could be varied by the aviator in flight for fast or slow flying. This design won the first prize presented by the President of the Aeronautical Society, but was turned down by the official experts. In 1907 I designed, built and flew the first two all-metal aeroplanes at the *Daily Mail* Competition at the Alexandra Palace. The machines had no struts or wire bracing, embodied the tractor propeller hemispherical entry, enclosed streamline body with non-lifting tail and hinged elevating flaps. (Bleriot, at a much later date, flew with a lifting tail, which was afterwards found to be wrong in practice.) The late Hon. Charles Rolls, in describing machines in the *Daily Mail* at that date, said my system of construction would be extensively used in the future. The Farnborough experts thought otherwise, and turned it down, preferring to play about with bamboo poles, bits of string and canvas. Prof. Junker developed the idea in 1918, followed by Short Brothers in 1920.

This year I submitted to the Research Department of the Air Ministry a new type of multo-ported oscillating split ring valve gear for aero engines, the chief feature of which is that the ports in the valve register alternately with the inlet and exhaust passages, and the design of the cylinder head is such that paraffin can be effectively vaporised without heating the induction pipes. The back face of the valve is both water and air cooled. The interior of the valve is wholly swept by the cool gases on the induction stroke; this means that the valve and combustion chamber can be kept moderately cool, and introduces the possibility of higher compression with increased efficiency without fear of pre-ignition. It has large free ports, and is positively operated by standard practice cam gear, has few working parts, light, simple, silent and accessible. The Air Ministry's engine experts graciously admitted that many of my claims were justified, but said they had no money for this type of experiment. What is more important in an aero engine than safety from fire, and a reliable valve which once it is installed like a sleeve valve, requires no further adjustment or grinding. They concluded their remarks by judging the merits of the design from the performance of a poppet valve aero engine (presumably because they had had no experience with any other type of valve gears), overlooking the fact that the working conditions are entirely different, and turned the design down on the following objections :—

Heat and lubrication, and pressure on the valve. (1) Heat, because they find the oil gets burnt in an aero engine by the hot piston, which is neither water nor air cooled on its driving face. They concluded the oil behind my valve must also get burnt, although it is wholly water and air cooled on its back face, and wholly cooled internally at each suction stroke. (2) At the point of exhaust opening the pressure in the combustion chamber would be nearly 50 lbs. per square inch. It would be realised, the efore,Ithat the friction against which the valve has to be moved would be very large and the danger of seizure ever present. Answer : I do not intend to open or move the valve when there is a pressure of 50 lbs. per square inch in the combustion chamber. This to my mind is a wicked waste of energy, and can be avoided with this valve gear. I know it is done in high-speed aero engines, but why ? Because with spring-returned valves the actual closing is unknown, and the valve heads have a baffling effect on the gases. In my long-stroke, high-compression positively operated large free port engine I can afford to keep the valve, stationary, opening late when the pressure drops below 20 lbs. which it will do in my engine, because of higher compression ratio and long stroke; also keep the inlet valve open late, because I know definitely when the exhaust and inlet ports are closed. Oil grooves are cut in the back face of the valve ; the suction and pressure strokes insure that there will always be a film of oil pulsating between the valve and cylinder head.

In conclusion, is it fair to compare an engine with a positive timing against one with a partially theoretical one ? Can a valve which is perfectly cooled get as hot as a piston, which is only cooled where there is the least heat ? Can a valve which is split and perfectly lubricated seize in its bearing ? I leave it to FLIGHT readers to judge. I don't blame the gentlemen of Kingsway for the attitude they take up. It is not their fault; it is the system operating. They are not sure of their ground off the beaten track, so in order that they should make no mistakes, they turn advanced ideas down, fervently hoping that nothing more will be heard of them while they are in office.

WILLIAM COCHRANE

## PILOT BALLOONS AND GLIDING

[2063] Whilst investigating the structure of the atmosphere by observing the rate of ascent of pilot balloons at Pyrton Hill in 1910-11, Mr. J. S. Dines observed a peculiarity in the movement of the balloons which might possibly be of great assistance to motorless aviators.

It was found that a balloon when released from the ground always ascended at a greater velocity than that determined from its physical properties for its ascent in still air. The excess velocity was found to decrease as the balloon gained height. These facts have also been noted by independent observers in France and Germany.

The explanation offered by Mr. Dines was that the balloons when near the ground naturally find their way into ascending currents, since these must be continually fed from below.

Use can be made of this in gliding experiments by releasing a number of balloons from such a place that they will drift towards the pilot's starting-point.

By gliding towards any balloon the pilot would greatly increase his chance of finding a region of ascending air.

To obtain the best results it would be necessary to use balloons with a negligible rate of ascent in still air.

The chief difficulty of course, would be in spotting the balloons, but out of a large number it should be possible to see two or three.

ALAN SMITH

## SOARING FLIGHT.

[2064] On October 16 I saw the fulfilment of an old, old dream. Twelve years ago, while convalescing at St. Leonards, the seagulls gave a gliding exhibition for my special benefit, and I described the flight of those gulls and how they could be copied by men on gliders if they had the necessary skill. I had not realised how soaring could be carried on for miles along a range of hills until those gulls supplied the key. The following extract from *The Field* of January 15, 1910, may be of interest at the present time :—

". . . . The seagulls at St. Leonards-on-Sea have since enlightened me by demonstrating without question the possibility of soaring flight under certain conditions of wind, when a glider once launched might be flown for perhaps 10 miles in one direction and back again to the starting point. There was a south wind blowing directly on to the sea front and in order to pass this barrier the wind had to rise in a huge wave over the houses and the hills behind. In similar conditions I have often seen these birds sitting on the wave with their heads towards the wind, but on this occasion a number (perhaps a hundred) of gulls were soaring without moving their wings and yet travelling from east to west. The birds flew in detachments of ten to fifteen, and this in somewhat open order, so that they were spread over a considerable portion of the wave. It was very noticeable that those which flew lowest were most affected by eddies, whilst those soaring at about 300 ft. had fewer difficulties in advancing. Instead of the birds being head to wind as they would be if floating only, they were turned to an angle of about 45° to the west, thus pointing to the fact that half the supporting power of the wave was being used by them to travel from east to west, the remaining margin being sufficient for their support at a constant altitude. I watched these birds travelling to the west until they arrived at the end of the sea front, where both houses and hills terminate, and then these living gliders simply turned their tails and heads to an angle of 45° in the opposite direction, and came sailing back over my head towards Hastings. Now, none of these birds did anything that an expert on a glider could not do, viz., balance and

steer, and I can therefore see no reason why a man with this duplex skill should not have spent the morning on a glider over the esplanade, instead of employing the usual bath-chair method of locomotion. It would, of course, be necessary to be launched on to the wind wave; but this could be done at the top of the hill, although possibly not without danger at St. Leonards. But there are hundreds of other ranges of hills in England where the wind rises in the wave-like form, and where the launching could be effected with comparative safety. It is quite conceivable for gliding matches to take place in the near future, the greatest skill being shown by the aviator who utilises the maximum of the wind wave for travel and the minimum for support. I fear, however, I am looking too far into the future; travelling by gliders can only come after expert manipulation of motor-driven aeroplanes, and that art is at present still in its infancy.

"GRIFFITH BREWER."

The time has now come when soaring on gliders is possible, because aircraft pilots have acquired in the past ten years, mainly during the War, that expert manipulation of motor-driven aeroplanes which was necessary as a prelude to successful gliding and soaring on the air.

The glider which made the most impressive flight on Oct. 16 did more than fulfil the forecast of twelve years ago. Its design carried the sport back twenty years, to the time when Wilbur and Orville Wright were learning to fly on their glider at Kitty Hawk. The glider was a biplane, with warping wings and skids instead of landing wheels, similar in principle to those made by the Wrights, who first controlled their flights so as to make it possible to fly again a hundred times and live to tell the tale. We have to thank our Continental neighbours for reviving the art by introducing gliding as a popular sport, because no doubt if it had been revived by Englishmen or Americans, it would not have been greeted with the enthusiasm which we see today.

It is interesting also to recall that Orville Wright, with Col. Alec Ogilvie, the giver of a prize in the present contests, set up a record of ten minutes' soaring flight eleven years ago, and this remained a world's record for ten years.

GRIFFITH BREWER

# Personals.

### Married

HERBERT DENNY PATTERSON (late Hampshire Regt., and R.F.C.), fourth son of Mr. John Patterson, of Aldershot, was married on October 23, at Holy Trinity, Margate, to MARGARET CECILLE, second daughter of the late Mr. CECIL WATT SUTHERLAND and Mrs. Sutherland, of "Lalsden," Cornwall Gardens, Cliftonville, Margate.

The marriage between A. E. LIONEL SKINNER, M.C., late Capt., R.A.F., son of Mr. and Mrs. Skinner, of 15, Norfolk Crescent, W. 2, and ELSIE, daughter of Dr. and Mrs. STURRIDGE, of 127, Dartmouth Road, N.W. 2, took place at St. James's Church, Spanish Place, on October 25.

NICHOLAS WYNDHAM WADHAM, Flight-Lieut. R.A.F., eldest son of Mr. and Mrs. John Charles Wadham, of Shanklin, Isle of Wight, was married on October 21, at St. John's Church, Smith's Square, Westminster, to AGNES MOIRA, elder daughter of the late WILLIAM TILLIE and Mrs. Tillie, of Elstow, Londonderry.

### To be Married

The marriage of EDWARD MORTON DRUMMOND, Black Watch, attached R.A.F., and DAPHNE TAYLOR will take place very quietly at the Chapel Royal, Savoy, on Friday, November 10, at half-past eleven o'clock, from her aunt's house, 39, Curzon Street.

The engagement is announced between ALLAN L. A. PERRY-KEENE, of the R.A.F., eldest son of Mr. L. H. A. Perry-Keene, of Rednal, Birmingham, and KATRINE LUCY, only daughter of Mr. C. A. SILBERRAD, I.C.S. (retired), and Mrs. Silberrad, of Park House, Combe Martin, N. Devon.

### Items

The will of the late Mr. JOSEPH DONALD SAGAR, of Heath Villas, Halifax, Yorks, a director of J. Sagar and Co., Ltd., saw-mill engineers, Canal Works, who was killed in an aeroplane disaster in France, has been proved at £38,034.

EDWIN CLEARY, of the Savage Club, John Street, Adelphi, W.C., actor, inventor and journalist, who was at one time manager for Paulhan, the French airman, and who died suddenly at Euston Station on August 3, aged 64, left no will, his property being valued at £100.

The will of the late PERCY JAMES EVANS, of Dale House, Russell Road, Moseley, and John Bright Street, Birmingham, motor agent, who was killed in an aeroplane accident at Saverne, Alsace, on July 16, has been proved at £41,219 gross.

# THE LONDON-CONTINENTAL SERVICES

**FLIGHTS BETWEEN OCTOBER 22 AND OCTOBER 28, INCLUSIVE**

| Route‡ | No. of flights* | No. of passengers | No. of flights carrying: Mails | No. of flights carrying: Goods | No. of journeys completed† | Average flying time (h. m.) | Fastest time made by | Type and (in brackets) Number of each type flying |
|---|---|---|---|---|---|---|---|---|
| Croydon–Paris ... ... | 23 | 100 | 5 | 19 | 22 | 3 2 | H.P.W.8B G-EBBG (2h.34m.) | B. (5), G. (10), H.P.W.8B (3). |
| Paris–Croydon ... ... | 24 | 92 | 5 | 22 | 21 | 3 7 | Breguet F-CMAG (2h. 24m.) | B. (5), G. (10), H.P.W.8B (3). |
| Croydon–Brussels–Cologne | 6 | 43 | 1 | — | 6 | 4 41 | D.H. 34 G-EBBT (4h. 23m.) | D.H. 18 (1), D.H. 34 (3). |
| Cologne–Brussels–Croydon | 7 | 48 | 4 | — | 7 | 4 13 | D.H. 34 G-EBBR (3h. 45m.) | D.H. 34 (3). |
| Croydon–Rotterdam ... | 6 | 3 | 6 | 6 | 6 | 2 55 | Fokker H-NABQ (2h. 35m.) | F. (5). |
| Rotterdam–Croydon ... | 6 | 5 | 6 | 6 | 6 | 2 18 | Fokker H-NABS (2h. 2m.) | F. (5). |
| Manchester–Croydon–Amsterdam | 6 | 45 | 3 | 2 | 6 | 6 20 | D.H. 34 G-EBBQ (5h. 42m.) | D.H. 34 (3). |
| Amsterdam–Croydon–Manchester | 6 | 30 | 6 | — | 6 | 5 15 | D.H. 34 G-EBBQ (4h. 43m.) | D.H. 34 (3). |
| Total for week ... | 84 | 366 | 36 | 55 | 80 | | | |

* Not including "private" flights.

† Including certain journeys when stops were made *en route*.

‡ Including certain diverted journeys.

Av. = Avro. B = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. Sp. = Spad.
Vi. = Vickers Vimy. Vu. = Vickers Vulcan. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Co. des Grandes Expresses Aériennes; Daimler Hire, Ltd.; Handley Page Transport, Ltd.; Instone Air Line; Koninklijkie Luchtvaart Maatschappij; Messageries Aériennes.

# AIRISMS FROM THE FOUR WINDS

How some people are misunderstood in their public utterances; or is it that present-day tabloid reporting at times summarises twenty lines into three or so, with the quite conceivable results of mutilation of a statement as originally uttered? In this respect Lord Robert Cecil appears to have been a very much maligned victim. Speaking the other day at a League of Nations demonstration, he said he was supposed to have advocated the possession by the League of a great fleet of aeroplanes, which should go and bomb the cities of any State supposed to be a wrong-doer until its cities were rendered uninhabitable. A more wild travesty, Lord Robert explained, of any observation he had made could not be imagined. He did say that in the next war, so far as he could see, there was nothing to prevent the bombing of cities so that they would be uninhabitable, but that, on the contrary, the advances of science had made such an operation not only practicable, but almost easy, that the greatest bomb dropped in London was a hundred times smaller than the bombs already invented, and that the threat to civilisation of an air attack in the future was something which anyone who realised it might well tremble at and fear lest it should be repeated. He did say that, but he never suggested that the League, of all institutions in the world, should take the lead in such a barbarous thing as that.

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THOSE who know Lord Robert could hardly have accepted as his words the mis-statement when originally made. But it is just as well to record the actual sense of his words.

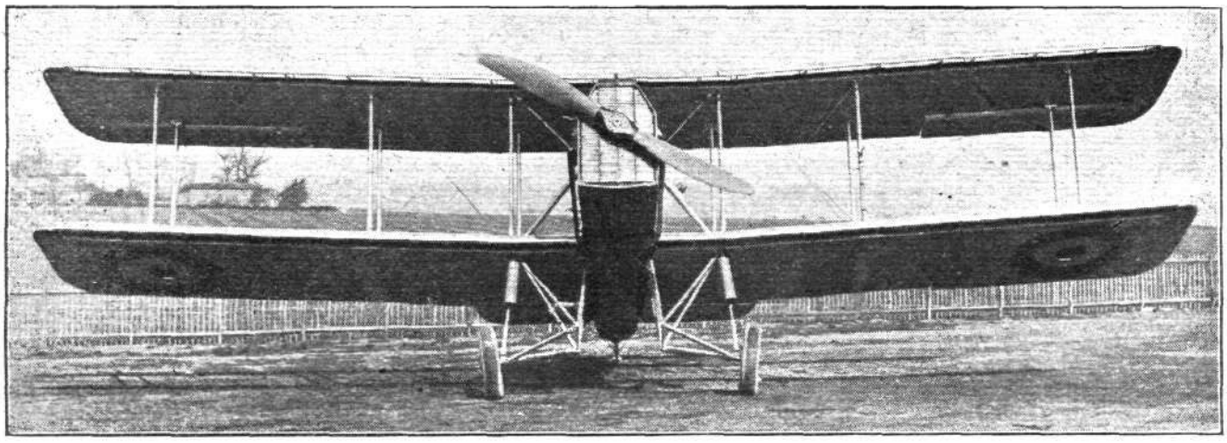
IT is to be hoped the *expose* of Mr. Claude Grahame-White of the slackness of Post Office officials to the actualities of air-post services may bring about its due reward. It is little use the P.M.G. putting forth his strength in encouraging the air mail if the horde of minor officials are too bored to absorb particulars of the regulations. Nailing down the actual post offices at fault, as Mr. Grahame-White does, is a welcome departure which can only lead to future alertness.

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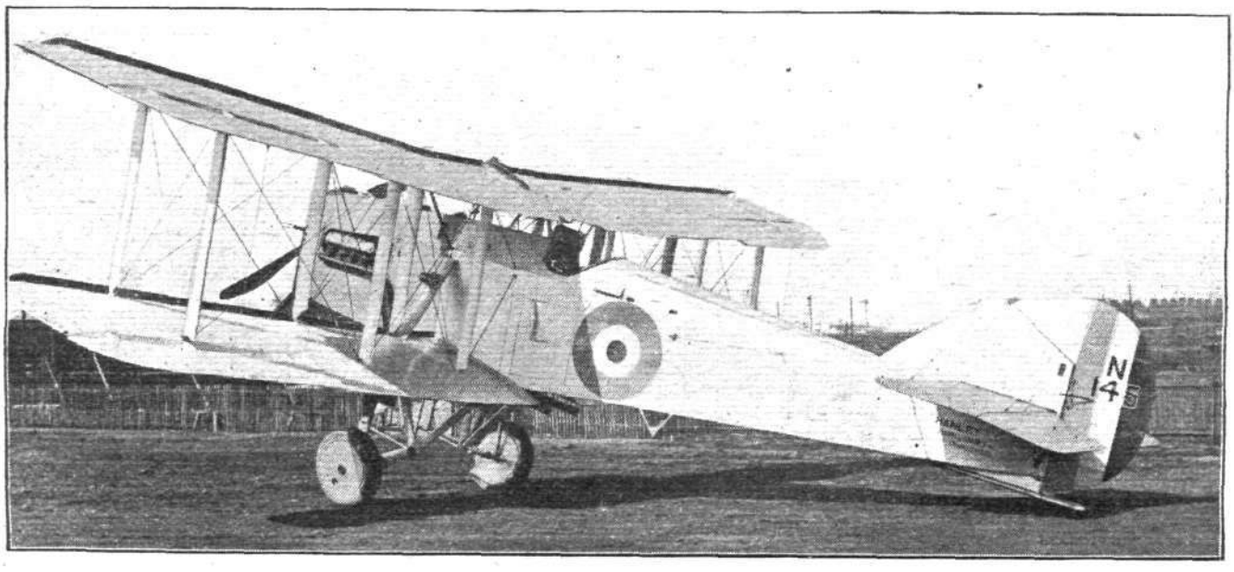
SIR JOHN NORTON-GRIFFITHS, Unionist M.P. for Central Wandsworth, has always been a keen believer in aviation. Therefore, his characteristic cablegram from South America, "Keep the home fires burning. Propose to fly home overland from Lisbon and save two days," immediately upon his hearing of the general election, was just what might have been expected from him. Here's to his success, with the meanwhile active campaigning on his behalf of Lady Norton-Griffiths.

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WITH the re-opening of the London–Brussels–Cologne air-mail announced by the G.P.O., we would once again ask, When, oh, when are those air-mail stamps going to arrive? It is just a little fillip of this nature that often inspires participation in supporting directly the early private enterprise which has been the means of building up the great British Empire. Aerial stamps are a silent but very practical form of advocacy.



**THE HANDLEY PAGE "HANLEY" TORPEDO 'PLANE: The front view gives a very good idea of the divided undercarriage which gives accommodation for the torpedo. The machine is fitted with slotted planes, and has slotted ailerons, which are found to be effective right up to the stalling angle.**




**THE HANDLEY PAGE "HANLEY": Three-quarter rear view.**

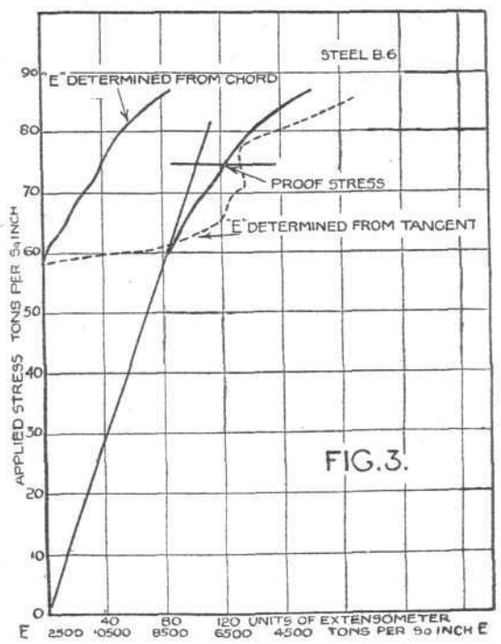
FLIGHT

# THE CASE FOR METAL CONSTRUCTION

By JOHN D. NORTH, F.R.Ae.S.

*(Continued from last week.)*

AN attack on this problem of local instability by rigid analytical methods is outside the scope of mathematical processes today, at least so far as the complex forms demanded for engineering reasons and indicated by experimental results are concerned. At the same time the elastic properties of those materials (*e.g.*, cold worked steels and hardened and tempered alloy steels) which are most suitable, are far removed from the simple proportionality necessarily assumed in elasticity problems. In spite of this we can obtain valuable guidance by reference to two simple cases for which mathematical solutions have been obtained. I do not mean that because the cases are relatively simple compared with those of the actual structural members which we are discussing that




the problems are simple ones. Anyone can disabuse his mind of this idea by looking up the references.

*Case* (*a*).—A flat rectangular plate loaded uniformly in its plane and supported at its edges.

*Case* (*b*).—A uniformly loaded circular tube.

(*a*) A method of obtaining this result, first discovered by Prof. G. H. Brian, is given in "The Mathematical Theory of Elasticity," by Prof. A. E. H. Love, on p. 540 of the third edition. A flat rectangular plate of thickness $2h$, and of sides $2a$ and $2b$, is assumed supported freely at its edges against motion perpendicular to its plane, and subject to uniform compressive loads $P_1$ and $P_2$ per unit length of edge.

Assuming perfect elasticity, in a state of neutral equilibrium the plate can distort by displacements perpendicular to its plane into a series of double sine waves, provided the following relationship holds :—

$$P_1 (m^2/a^2) + P_2 (n^2/b^2) = 1/4\ D\pi^2 (m^2/a^2 + n^2/b^2)^2$$

In the above $m$ and $n$ are integers expressing the number of half waves into which the lengths $2a$ and $2b$ are divided respectively, and are those which give the lowest values for

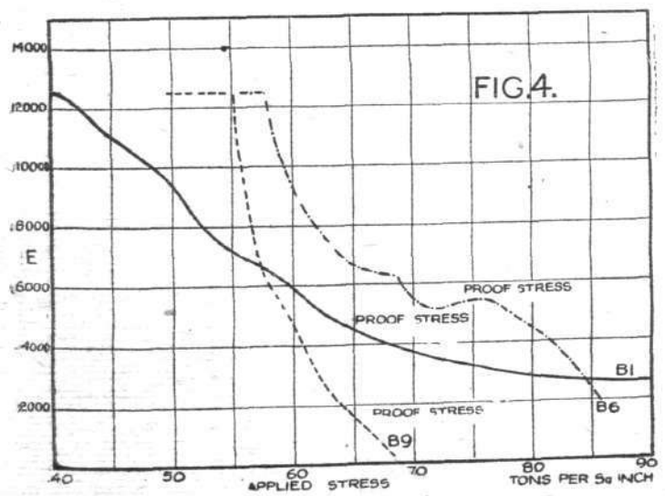
*Critical Stress in Outer Compression Fibres of Strut or Beam.*

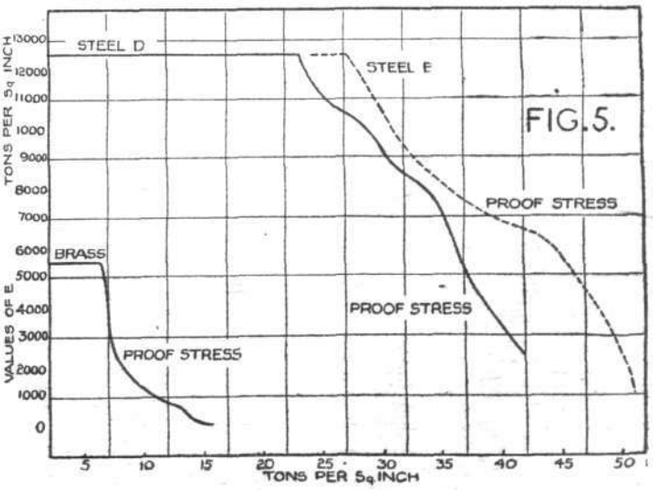
| Material. | Identification composition. | Critical stress. | Specific gravity. | Critical stress. / Specific gravity. |
|---|---|---|---|---|
| Spruce .. .. | Spec. 2 VI .. | 2·01 | 0·45 | 4·47 |
| Hard rolled al. strip. | L. 4—A.L. 98% | 8 | 2·6 | 3·08 |
| | *Spec. 2 L. 3.* | | | |
| Al. alloy strip .. Duralumin .. | Cu. 4·0% Mn. 0·5% Mg. 0·5% | 13·5 | 2·85 | 4·74 |
| H.T. Alum. alloy | L. 29 .. .. | 19 | 3·15 | 6 |
| | *Spec. S. 3.* | | | |
| Mild steel .. | C. 0·2% normalised. | 18 | 7·8 | 2·31 |
| Plain carbon .. | C. 0·1%, cold rolled | 28 | 7·8 | 3·59 |
| | C. 0·1%, blued | 24 | 7·8 | 3·08 |
| | *Spec. S. 44.* | | | |
| B. and P. test results. | C. 0·4%, blued | 35 | 7·8 | 4·49 |
| | *Spec. S. 43.* | | | |
| Alloy steel strip | C. 0·2% Mn. 0·4% Ni. 3·5% Cr. 1·0% Va. 0·1% | 40 | 7·8 | 5·13 |
| | *Spec. S. 40.* | | | |
| Hardened and tempered. | C. 0·3% Mn. 0·4% Ni. 4·25% Cr. 1·0% Va. 0·1% | 65 | 7·8 | 8·33 |

*Note.*—Except where otherwise stated the figures are for B.E.S.A. specification.

$P_1$ and $P_2$. D is the "flexural rigidity" of the plate, and is equal to $2Eh^3/3\ (1-\sigma^2)$, where E is Young's modulus and $\sigma$ is Poisson's ratio for the material.

For our purpose we consider an infinite flat strip of thickness $t$, and of breadth B, freely supported along its edges and loaded parallel to its length only by a uniform compressive stress of intensity $p$.



Let the half wave-length in the longitudinal direction be $l$. Then in the above equation :—

$$2a/m = l$$
$$2b = B$$
$$P_1 = pt$$
$$P_2 = O$$
$$2h = Y$$
$$D = EY^3/12\,(1-\sigma^2)$$

and $$pt \times 4/l^2 = \frac{Et^3\pi^2}{48(1-6^2)} \times \left(\frac{4}{l^2}+\frac{4n^2}{B^2}\right)^2$$

For a minimum $n = 1$ and $l = B$ giving $p = \frac{\pi^2}{3(1-6^2)} \times \frac{Et^2}{B^2}$

The constant term in this expression is of limited practical value, but the result is important as indicating the manner in which the variables involved are to be taken into account.

(*b*) This case is examined fully by Mr. R. V. Southwell in his paper on "The General Theory of Elastic Stability" (*Phil. Trans. Roy. Soc.*, Ser. A., Vol. 213). It is sufficient for our purpose to note that the critical stress in a tube of radius R for all forms of failure is proportional to E $t$/R.

These results and a consideration of the general theory of thin shells indicate the factors governing the intensity of stress at which instability will occur.

Firstly this stress is proportional to the value of E. In those classes of steels where there is a well-defined yield point shortly after the limit of proportionality is reached the meaning of this is very simple. At the yield point E "collapses" and so does the shell. Provided thickness/radius of curvature is above a certain figure its value has practically no influence on the stress at which instability occurs. But with cold worked and hardened and tempered materials the case is different. The limit of proportionality may be very low, and the rate of change of curvature of the stress strain curve is very slow. An endeavour has been made to define some structurally important stress to meet this difficulty, and the result of these efforts is incorporated in the B.E.S.A. specifications S40 and S43 under the term "proof" stress, which is defined as follows.

The proof stress is the greatest load per square inch which, when applied to the test piece for 15 seconds and removed, produces a permanent extension of not more than 0·1 per cent. of the gauge length. The proof stress shall be determined upon a test piece having a gauge length of exactly 4 ins. When a stress of 40 tons per square inch is applied to the specimen, and maintained, the total temporary extension of the gauge length must not be greater than 0·017 in., and when a stress of 50 tons per square inch is applied to the specimen and maintained, the total extension of the gauge length while under load must not be less than 0·020 in.

It has been customary for some time to identify this stress with the maximum realisable in a thin walled structure, however small the curvature might be with respect to the thickness of the shell and the "free" length of the arc. From considerations already indicated this is not correct, and indeed "proof" stress can only have a significant bearing on the stress at which failure by crinkling will occur if the slope of the stress-strain curve of a given material is always constant at the proof stress. This opens up what is, I believe, a new method of examining the structural properties of a material, namely, by a consideration of its elastic properties over the whole of its stress range. The term "elastic" is used here in the same loose sense that "E" has been used for the slope of the stress-strain curve beyond the limits of proportionality and into the region of plastic deformation. So far as the immediate problem is concerned, although it is of some importance whether the extension is elastic or plastic, there are good grounds for believing that the limit of proportionality is not, in all classes of steel, necessarily the dividing line between these two states. The alternative to the loose use of these terms is either unnecessary verbosity or a "specially invented terminology," and I feel that laxity is the least of the three evils, and that there is little danger of being misunderstood.

I suggest that the physical properties of a material, *so far as the "critical" stress in a thin-walled member is concerned*, are best represented by the first differential of the stress strain curve with respect to stress. Fig. 3 shows such a curve, together with the stress-strain curve from which it is derived, for a nickel-chrome steel hardened and tempered at 300 C. There are obvious difficulties in preparing such a curve where the mechanical errors of graphical differential are superimposed on the inevitable inaccuracies of strain measurement, but the broad significance of such a method of presentation may be appreciated by a reference to Fig. 4, where the "elasticity-stress" curves are given on a more convenient scale for three nickel-chrome steel specimens (A) fully hardened, (B) hardened and tempered at 300 C., (C) hardened and tempered at 500 C. (B) is taken from Fig. 3.

Fig. 5 gives the same curves for the following material :—

Steel D—Cold-worked steel blued at 100° C.
Steel E—Cold-worked stainless iron (not blued).
Brass—Muntz metal (cold-drawn).

| | *Proof Stress.* Tons per Sq. In. | | Tons per Sq. In. |
|---|---|---|---|
| Steel B.9 .. | 65·75 | E. .. | 1,300 |
| ,, B.6 .. | 76·5 | E. .. | 5,400 |
| ,, B.1 .. | 66·25 | E. .. | 4,300 |
| ,, E. .. | 48·5 | E. .. | 3,600 |
| ,, D. .. | 40·75 | E. .. | 2,900 |
| Brass .. | 14·75 | E. .. | 100 |

From this it will be seen that there is no simply defined critical stress, and that by varying the curvature to the thickness and the *free* arc length we can push further along the curve with lower values of E and higher "critical stress."

It is clear that there would be serious difficulties in verifying commercially these elastic properties of a metal, but this is an aspect of the case to which I will return later, when discussing inspection and testing.

As regards the influence of the form of the wall or shell on the critical stress, the significant features are the curvature of the arc, its *free* length and the thickness. Experimental results within my experience indicate that other things being equal (including the value of E), the critical stress is proportional to the thickness as foreshadowed by a general consideration of the theory of thin shells, but in dealing with the question of form, the difficulty lies in the *free* length of the arc. The problem is analogous to that of a redundant structure in which the members are not pin-jointed, and is hopelessly complicated by sectional deformations and the variations of E.

Apart from these difficulties we have those relating the fibre stresses to the external forces on the member. It is convenient to represent the fibre stresses, as deduced from experimental evidence of load and deflection, as—

$P/A + Pd/Z$, for direct compression loads,

and as $P/A + \frac{Pd}{Z} + \frac{BM}{Z}$ where there are external shear loads ;

where
$P$ = end load
$A$ = area
$BM$ = bending moment
$Z$ = section modulus
$d$ = deflection

The usefulness of these expressions in ordinary engineering should not blind us to the limitations imposed by the assumptions on which they are based, all of which are violated in the structures we are considering. It is perhaps not too much to say that they have no *real* meaning, and that the "stress" calculated can only justifiably be used for estimating the loads which members of similar form will sustain within limits of the ratio of shear to end load permitted by the extent of the experimental evidence. To interpret this stress as representing the *actual conditions* governing the local failure of the shell is dangerous and misleading.

In determining the deflection, and in consequence the stress, in a laterally loaded strut in which the stress induced is beyond the limit of proportionality, the variation of "E" must be considered differently. In this case the actual stress for an assumed given strain instead of the increase of stress for a hypothetical small increase of strain, is required, and therefore E is determined by the slope of the chord from the zero of the stress strain diagram to the appropriate point of the curve instead of by that of the tangent at the appropriate point. In the calculation a trial and error method must be used with an assumed value of E, and a further uncertainty is introduced by the fact that all points of the member are not equally stressed. Experiment has verified the obvious conclusion that the effective E for calculating the deflection lies somewhere between the "chord" value for the maximum stress and the maximum value, but it is not possible at present to give any more definite information, since the experimental "mean" value of E deduced from measurements of deflection is influenced by distortions not taken account of by the simple beam theory. The "chord" value of E for the steel B.6 is plotted against stress in Fig. 3.

All this may seem rather hopeless, from the scientific point of view perhaps it is, but let us consider the whole process by which a structural member of an aeroplane is designed.

Firstly, the conditions of flight for which the aeroplane is to be designed. These are fixed by an Order in Council, and are interpreted by a series of good round numbers delivered after much labour by a committee. Over the manner of arriving at these numbers a decent veil is cast which it would be unwise to disturb. But the Committee seems to know its job in so far as the aircraft are not abnormally heavy, nor do they collapse in the air. These numbers are converted to external forces in a particular manner founded on precedent,

supported by very doubtful aerodynamic data and also fortified by the same Order in Council. The loads in the members are then estimated by ignoring those members to take account of whose presence would seriously complicate the calculations and by making what are often the wildest assumptions as to the nature of the joints between the members. This brings us to that very data which we were regretting our inability to interpret in an accurate scientific manner. But the whole process works after a fashion because aeroplanes are not designed by science, but by art in spite of some pretence and humbug to the contrary. I do not mean to suggest for one moment that engineering can do without science—on the contrary, it stands on scientific foundations—but there is a big gap between scientific research and the engineering product which has to be bridged by the art of the engineer.

Nevertheless, the technique of the design of thin metal members is progressing rapidly. To arrive analytically by measuring the frictional coefficient of the cloth, the resilience of the balls and cushions, at the precise way to play a complicated stroke at billiards is practically hopeless, but practice and a knowledge of principles deduced from scientific analysis of simple cases will produce surprising results. So it is that, over a wide range, light metal members can be designed with every confidence that they will fulfil their designer's expectations and realise the advantages in weight economy foreshadowed by the properties of the materials.

### Inspection and Manufacture

It would be perhaps too much to say of light metal construction that the material is half the battle, but there would be a strong element of truth in such an assertion. I am not suggesting that there is one particular class of steel or light alloy which will be found to be ideal for all purposes. On the contrary, I believe that the types of material used in a single metal aeroplane will increase as time goes on. What we require are materials that can be produced with the necessary degree of uniformity both as regards their elastic properties in the sense these have already been discussed, and as regards their plasticity, both absolute as ductility, and in relation to the *true* elastic properties. This last is required to be reasonably uniform in the state in which the strip is to be worked (sections formed from strip and riveted together are the most characteristic forms of light metal construction). The strip in forming through rolls or dies springs back from the profile of the tool by an amount dependent on its resilience. Reasonable limits are thus required if tools are to produce a satisfactorily uniform article. Control at present is limited to an upper and lower " proof " stress and a bend test. These tests, comparatively simple as they appear, seem somewhat to strain the capacities of commercial testing and inspection without giving as much information as is required.

What is wanted is a stress/strain diagram from which the properties of the materials can be deduced, and it is unfortunate that there is no machine capable of producing them commercially and reliably. For that matter there is not even a standard extensometer which is commercially practical. It is possible that this class of testing apparatus may be improved in the near future. There is also the alternative that research may show a connection between these elastic properties and some more easily measured feature of the material. It is a matter well worth the attention of metallurgists, testing engineers and physicists generally.

A further mechanical uniformity in strip is required in thickness, flatness and straightness. The tolerances laid down in the B.E.S.A. specifications seem satisfactory, and more than a slight departure from them often leads to manufacturing troubles.

The problem of manufacture from the strip onwards has two phases which are novel and of special importance. Firstly, forming the strip. Secondly, riveting it.

There is a simple formula for designing tools for forming strip. It is " live and learn." Direct attack on the resilience problem is probably hopeless, but one soon arrives at a few general principles of design, though when marked departure from experience comes along it often brings rude shocks in its train. There are broadly three methods of forming strip—rolling, drawing and pressing—and all have their uses and limitations; but whatever method is used (all are really required), it is necessary in order to get the best results, to have machines of special design, and my own experience is that it is most satisfactory to design and make them on the spot.

The commonest process in aircraft work is to form the strip in its final state of treatment, but although this has great advantages in assisting production by eliminating heat treatment processes, I believe that a certain amount of soft forming with subsequent heat treatment or even hot forming will be in regular use, by reason of the wider scope of materials and forms opened up. With satisfactory tools and uniform material the production of formed sections makes little demand on skilled labour and can easily be brought to a large production standard.

Riveting is a problem less easily tackled, it is so indefinite. The number of rivets in a steel aeroplane runs into many tens of thousands. The cost of riveting and all it implies is probably the critical factor in the cost of production, and the profit and loss scale will be turned by the drawing office and the planning department. This phase of technique is being slowly and painfully developed, and it is here to a large extent that the high cost of development appears. Metal construction is not inherently expensive. All our experience of the manufacture of details where the technique is in an advanced state confirms this. Money is spent on mistakes and errors of judgment, trial and error, the foundation stones of experience.

*(To be concluded.)*

# THE ROYAL AIR FORCE

*London Gazette, October* 20, 1922

*General Duties Branch*

J. M. Darroch is granted short-service commn. as Pilot Offr. on probation, with effect from, and with seny. of, Sept. 2.

*Memorandum*

The permission granted to Sec. Lieut. E. S. Smyth to retain his rank is withdrawn on his joining the Army.

*London Gazette, October* 24, 1922

*General Duties Branch*

Flt. Cdt. C. Guppy, having successfully passed through the R.A.F. (Cdt.) Coll., is granted a permanent commn. as Pilot Offr., with effect from, and seny. of, Oct. 6. Flying Offr. G. H. Martingell, A.F.C., is granted a permanent commn., retaining his present substantive rank and seny.; Oct. 24, 1919 (*Gazette*, Oct. 24, 1919, appointing him to a short service commn. is cancelled). The seny. of Pilot Offr. E. A. Hodgson is antedated to Aug. 16, 1921. The follg. are granted short service commns. as Flying Offrs., with effect from, and seny. of, the dates indicated:—M. R. Banks; Oct. 16. A. E. Evans, D.F.C.; Oct. 12. C. Sutton; Oct. 16.

The follg. officers are granted temp. commns. in ranks stated, on seconding for four years' duty with R.A.F.; Oct. 16:—

*Flying Offrs. (Hon. Flight Lieuts.).*—Capt. E. L. O. Baddeley, Middlesex R. Capt. L. F. Marson, M.C., 4th Dragoon Gds.

## ROYAL AIR FORCE INTELLIGENCE

**Appointments.**—The following appointments in the R.A.F. are notified:—

*Squadron-Leaders*: A. H. S. Steele-Perkins, O.B.E., from Record Office (Inland Area) to Aircraft Depot, Egypt (Middle East Area). 13.10.22. O. T. Boyd, O.B.E., M.C., A.F.C., from Air Ministry (Director of Operations and Intelligence) to command No. 24 Squadron (Inland Area). 23.10.22. E. P. Punch, from Aeroplane Experimental Establishment (Coastal Area) to No. 7 Group Headquarters (Inland Area). 26.10.22.

***Flight Lieutenants:*** N. P. Dixon, A.F.C., from R.A.F. Cadet College (Flying Wing) (Cranwell) to Boys' Wing (Cranwell). 9.10.22. V. A. Albrecht, O.B.E., M.C., from Army (Manchester Regiment) to No. 4 Flying Training School (Middle East); on appointment to Temporary Commission in the Royal Air Force on being seconded from the Army. 25.9.22. R. G. J. McCullagh, to Research Laboratory and Medical Officers' School of Instruction; on appointment to Short Service Commission. 4.10.22. J. J. Boyle, to Headquarters, R.A.F., Iraq, on appointment to Temporary Commission in the Royal Air Force on attachment for 4 years from the Army Dental Corps. 1.10.22. O. R. Gayford from No. 1 Flying Training School (Inland Area) to Headquarters, Constantinople. For duty as Adjutant. 28.9.22. E. A. Fawcus, from No. 1 School of Technical Training (Boys) (Halton) to School of Photography. (Supernumerary.) 25.9.22. G. Bowen, from Iraq Group Headquarters (Middle East Area) to Aircraft Park (Middle East Area). 11.1.22. F. E. Johnson, to Research Laboratory and Medical Officers' School of Instruction (Coastal Area); on appointment to Short Service Commission. 30.9.22. F. W. Trott, O.B.E., M.C., from No. 24 Squadron (Inland Area) to Headquarters, Constantinople Wing. 28.9.22. E. V. Longinotto, A.F.C., from Air Ministry (Director of Personnel) from R.A.F. Depot (Inland Area). (Supernumerary.) 9.10.22. A. W. Turner, from R.A.F. Depot (Inland Area), from Headquarters, Constantinople Wing. 28.9.22. H. G. Crowe, M.C., from No. 39 Squadron (Inland Area) to School of Photography (Inland Area) (Supernumerary). 19.10.22. E. W. Longden, from Armament and Gunnery School (Inland Area) to R.A.F. Depot (Inland Area). 19.10.22. C. Y. Roberts, from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to Aeroplane Experimental Establishment (Coastal Area). 23.10.22. C. P. O. Bartlett, D.S.C., from No. 30 Squadron (Iraq) to R.A.F. Depot (Inland Area) (Supernumerary). 20.8.22. J. S. Goggin, from R.A.F. Base, Gosport (Coastal Area), to Palestine Wing Headquarters (Middle East Area). 23.10.22. B. F. Beatson, D.T.M., from Indian Medical Service to Research Laboratory and Medical Officers' School of Instruction (Coastal Area); on appointment to Temporary Commission in the Royal Air Force on being seconded for two years from the Indian Medical Service. 13.10.22. J. Duminy: the notification which appeared in Royal Air Force Intelligence No. 82, dated 19.10.22, wherein this officer was posted from R.A.F. Depot to Headquarters, Coastal Area, with effect from 16.10.22, is hereby cancelled.

## INSTITUTION OF AERONAUTICAL ENGINEERS

The first lecture of the session was given on October 13 at the Engineers' Club, Coventry Street, when Mr. C. W. Tinson, A.F.R.Ae.S., M.I.Ae.E., read the first section of a paper on "Constructional Design of Aeroplanes." The second section of this paper was read on October 27, and the third and last section will be read on Friday, December 1, at 6.30 p.m., at the Engineers' Club.

The first section of Mr. Tinson's paper dealt with fuselage design, parallel bracing wires, unbraced bays, etc. The lecturer then continued to give hints on finding the centre of gravity of the fuselage, on using the "Ellipse of Inertia" for obtaining a comparison of manœuvrability. The last part of this section dealt with the design of controls.

In his second section Mr. Tinson continued the subject of controls, referring to the question of gearing and balancing of control surfaces. The lecturer also made a short reference to the "differential" type of aileron control. Finally Mr. Tinson returned to the subject of fuselage design, dividing a fuselage into three main portions, and dealing with the design of each portion in some detail, concluding with a few remarks on the design of tail adjustment gear.

As already mentioned, the third and last section of Mr. Tinson's paper will be read on December 1, at 6.30, at the Engineers' Club, Coventry Street.

*Fixtures for 1922-23.*

November 17, 6.30 p.m.—Paper, "Oleo Undercarriage Design," read by Mr. G. H. Dowty, Member. Engineers' Club, Coventry Street, W. 1.

December 1, 6.30 p.m.—Third and last section of paper by Mr. C. W. Tinson. Engineers' Club, Coventry Street, W. 1.

December 15, 6.30 p.m.—Paper, "Experimental Data without Wind Channel," read by Mr. O. T. Gnosspelius, A.C.G.I., A.F.R.Ae.S., Member. Engineers' Club, Coventry Street, W. 1.

1923. January 12, 6.30 p.m.—Paper, "The Seaplane for Commercial Duties," read by Major D. C. M. Hume, A.M.I.E.E., A.F.R.Ae.S., Member. Engineers' Club, Coventry Street, W. 1.

January 26, 6.30 p.m.—Paper, "Wind Tunnel Work at the N.P.L.," read by Mr. W. L. Cowley, A.R.C.S., D.I.C., Wh. Sc., Member. Engineers' Club, Coventry Street, W. 1.

February 9, 6.30 p.m.—Paper, "Seaplane Design," read by Mr. W. O. Manning, A.F.R.Ae.S., Member. Engineers' Club, Coventry Street, W. 1.

February 23, 6.30 p.m.—Paper, "Aerofoils," read by Dr. A. P. Thurston, Member. Engineers' Club, Coventry Street, W. 1.

March (date to be announced).—General Meeting, followed by a paper on "Aerial Photography," by Lt.-Col. J. T. C. Moore-Brabazon, M.C.M.P. (President). Engineers' Club, Coventry Street, W. 1.

March 28, 2.30 p.m.—Visit to the Aerodynamics Department of the National Physical Laboratory, Teddington.

April 12, 6.30 p.m.—Paper, "Some Controversial Points in Aircraft Detail Design," read by Mr. F. T. Hill, Wh. Ex., A.F.R.Ae.S., Member. Engineers' Club, Coventry Street, W. 1.

April 25, 3 p.m.—Visit to the Works of the Standard Insulator Co., Ltd., Kilburn, by courtesy of Mr. F. R. Simms, M.I.Mech.E., M.I.A.E., Member.

May 11, 6.30 p.m.—Paper, "Experimental Flying with over 200 Different Types of Planes," read by Major M. E. A. Wright, A.F.C., R.A.F. Engineers' Club, Coventry Street, W. 1.

May 26, 3 p.m.—Visit to the Instone Air Line, Croydon.

L. HOWARD FLANDERS,
Secretary

## SIDE-WIND

ROLLS-ROYCE, LTD. (consequent on a certain public announcement which has come to their notice), desire to make it known that they are not selling, and never have sold, any of their "Hawk" aero engines for the purpose of motor-cars, and that any purchase or use of those engines would not be consequent on their advice or recommendation, but would be solely on the responsibility of the parties so using them.

## SOCIETY OF MODEL AERONAUTICAL ENGINEERS
### (London Aero-Models Association)

MEMBERS are specially requested to attend at Parliament Hill on Sunday morning next with both a model glider and model aeroplane, for the purpose of giving a demonstration. Meetings are held at Headquarters (20, Great Windmill Street, Piccadilly Circus, W. 1), every Friday evening, at 7.30 p.m. Full particulars of the Society can be obtained from the Hon. Secretary, A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

## IMPORTS AND EXPORTS, 1921-1922

**AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; and for 1921, see "FLIGHT" for January 19, 1922.**

| | Imports | | Exports | | Re-Exportation | |
|---|---|---|---|---|---|---|
| | 1921. | 1922. | 1921. | 1922. | 1921. | 1922. |
| | £ | £ | £ | £ | £ | £ |
| Jan. ... | 4,459 | 1,152 | 87,128 | 76,552 | 2,285 | 23 |
| Feb. ... | 2,379 | 567 | 59,829 | 69,129 | 19 | 1,100 |
| Mar. ... | 14 | 1,471 | 118,199 | 166,607 | 1,565 | 100 |
| April... | 1,370 | 3,846 | 138,983 | 139,995 | 450 | 5,880 |
| May ... | 3,350 | 2,416 | 59,624 | 167,999 | 1,818 | 4,254 |
| June ... | 5,181 | 816 | 79,713 | 129,137 | — | 14,530 |
| July ... | 540 | 1,039 | 530,628 | 24,405 | 860 | — |
| August | 343 | 198 | 111,595 | 88,910 | — | 685 |
| Sept. ... | 620 | 3,043 | 145,755 | 71,508 | — | 44 |
| | 18,256 | 18,548 | 1,331,454 | 934,242 | 6,997 | 26,616 |

## AERONAUTICAL PATENT SPECIFICATIONS

*Abbreviations:* cyl. = cylinder; I.C. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

### APPLIED FOR IN 1921

*Published October 26, 1922*

14,434. N. SCHREIBER. Aeroplane suitable as toy or for sport. (186,374.)
17,729. A. MORRIS. Clinometers, etc. (186,427.)
18,031. D. A. PAVELY. Compressed air power plant for model aeroplanes, etc. (186,438.)
19,095. C. BROADWICK. Parachutes. (186,460.)
19,357. VICKERS, LTD., and SIR J. MCKECHNIE. Reciprocating engines. (186,464.)

*Published November 2, 1922*

17,893. A. OVERBEEK. Helicopters with two propellers rotatable in opposite directions. (186,688.)

### APPLIED FOR IN 1922

*Published October 26, 1922*

17,943. F. W. BALDWIN. Propeller driving-gear. (186,566.)
20,490. AUGUSTINE AUTOMATIC ROTARY ENGINE CO. Connecting-rods (186,567.)

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